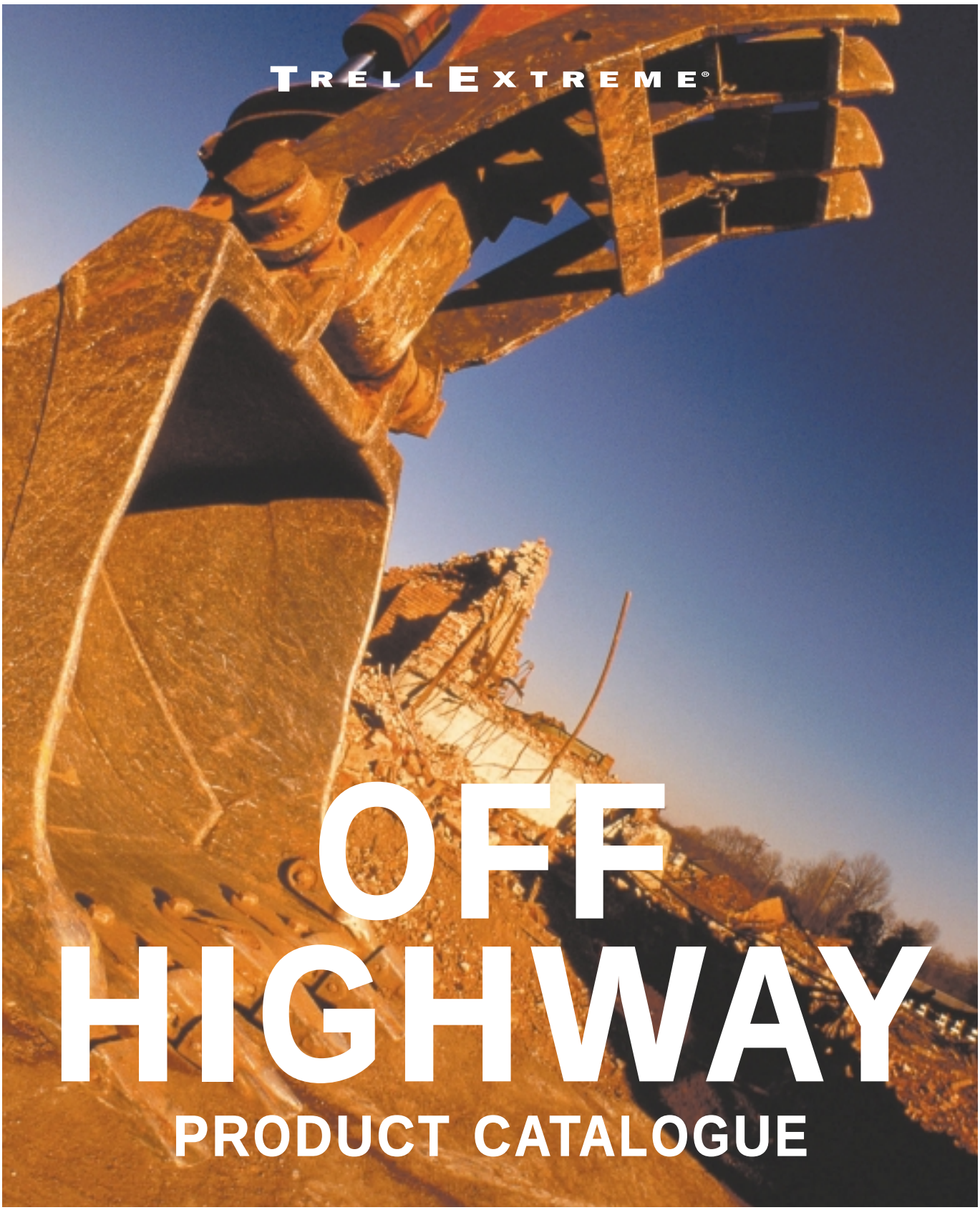


TRELLEBORG

YOUR PARTNER IN TOUGH
TERRAIN

Trelleborg Industrial AVS

Sound solutions for your world 4
How to control vibration 6

Vibration Theory

Vibration Theory 8

Products

Assistance Guide 14
MDS Mounting 16
Metacone™ 18
HydroMounting 26
Compactor Shearmounting 27
Cushyfloat™ Special 28
Cab Mounting 30
2-piece CR Mounting 32
EH 34
Mushroom 36
Suspension Systems 38
Spherilastik™ 39
Control Links 40
Conical Bearing 41
Suspension Spring 42
Washers 43

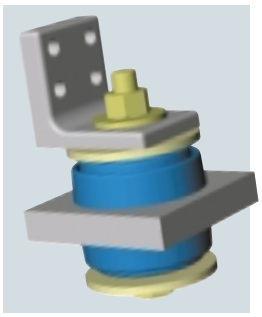
Trelleborg IAVS is a world leader in the design and manufacture of rubber to metal bonded components for anti-vibration applications and suspension systems. There are three main brands: TrellExtreme® in off-highway, Metalastik® is used in rail and marine applications and Novibra® in industrial and power generation applications. The company`s head office, technical centre and research and develompment units are located in Leicester, UK while production is divided between Leicester and two Swedish factories at Trelleborg and Sjöbo. There are regional offices in Belgium, France, Germany, Italy, the Netherlands, Sweden and the United States. Trelleborg Industrial AVS is approved to ISO 9001. The Trelleborg Group is a global group with 15 000 employees in 40 countries and an annual turnover of 1 600 MEuro.

SOUND SOLUTIONS FOR YOUR WORLD

Trelleborg Industrial AVS is your partner in tough terrain. The company has developed the new TrellExtreme® range of isolators specifically for off-highway vehicles – from the smallest skid steer loader and mini excavator to the largest articulated dump truck. These superior vibration isolation systems with motion control are designed to protect vehicle operators from the harmful and fatiguing effects of vibration and noise in extreme off-highway conditions. With our new TrellExtreme® range and our specialized expertise in vibration control, we can help you find the optimum off-highway solution.

CONTROL LINK

The primary function of Trelleborg Industrial AVS antivibration mountings is to eliminate harmful vibration and effectively reduce structure-borne sound. Our mission is to be our customers' preferred choice for engineered solutions in the Industrial, Off-highway, Rail and Marine markets.



Unrivalled resources

Trelleborg Industrial AVS has all the resources you would expect from a global market leader:

- An R&D centre and purpose-built, state-of-the-art manufacturing plant at our Leicester head office in the UK, plus production facilities in Sweden.
- Our own laboratories equipped with the very latest compound formulation, modelling and simulation technologies for material and product development.
- An advanced mixing facility to prepare compound on site under clean and rigorously controlled conditions.

Total solutions

Trelleborg Industrial AVS provides far more than optimum technical solutions based on computer-managed calculations. Our overall approach to solving vibration problems encompasses:

- Education and training in vibration techniques to increase understanding and knowledge of vibration problems.
- World-class testing facilities including a comprehensive program of static, dynamic and fatigue testing at our technical centre in Leicester.
- Advanced simulation techniques such as Finite Element Analysis (FEA) and multi body vibration analysis software to simulate the loads that products have to withstand over a full service life.

Continuous development

We have developed the special TrellExtreme® range for the off-highway market, but we don't stop there:

- We invest continuously in the development of our products and the materials we use.
- Our laboratories continually measure and control specifications of raw materials and finished products.
- And, as a member of the Trelleborg group, Trelleborg Industrial AVS is in a position to fully control the complete production process and all vital raw materials.

Environmental improvement

Our aim is to exceed the requirements of current and future environmental legislation and set a standard for others to follow:

- We constantly review our manufacturing processes in the drive for year-on-year environmental improvement.
- Our strategy includes the continued elimination of solvents, significantly reducing emissions into the atmosphere, water purification and decreasing notifiable waste.
- In our industry we lead the way in the increased use of aqueous metal degreasing methods, water-based bonding agents and protective finishes.

Overcoming complexity

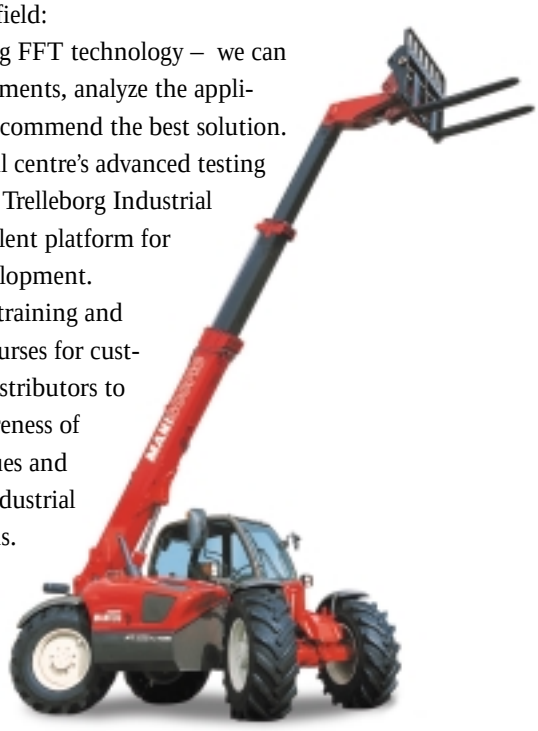
Vibration problems are often complicated. We assist our customers every step of the way:

- Our technical department helps customers evaluate spring mass systems in order to achieve ideal solutions to specific vibration problems.
- The advanced computer programs we use are designed in cooperation with technical universities.
- Specialists in design engineering and product development work alongside customers to ensure a successful project outcome: products with outstanding performance benefits.

Promoting insight

Trelleborg Industrial AVS offers top-grade training and testing in its field:

- Analysis using FFT technology – we can take measurements, analyze the application and recommend the best solution.
- Our technical centre's advanced testing facilities give Trelleborg Industrial AVS an excellent platform for product development.
- We conduct training and education courses for customers and distributors to increase awareness of vibration issues and Trelleborg Industrial AVS solutions.



HOW TO CONTROL VIBRATION

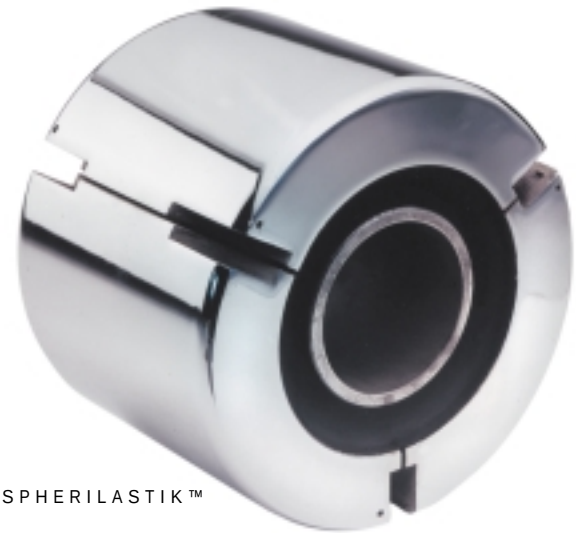
Causes and consequences

Vibration is generated by all kinds of machinery, particularly equipment with rotating or reciprocating movements. If solidly mounted, these generated motions are transmitted directly to the foundations causing irritating noise in the immediate surroundings of the machine installation. Noise may also occur in areas some distance away, transmitted through the structure. This is normally referred to as structure-borne noise (structural noise). In addition to noise, the creation of vibration can cause serious problems to sensitive machinery. The human body, too, can be adversely affected and this manifests itself in reduced working capacity, tiredness, and headaches caused by both high and low frequencies. Extremely low frequencies with considerable movement cause motion sickness and seasickness.

Combating the problem

The harmful effects of noise can be eliminated by:

- Minimizing both imbalance in the machine and the machine's natural vibrations by applying greater accuracy in manufacture, optimum design of engine balance, etc.
- Vibration-isolating the machine to prevent transmission of vibrations.
- Vibration-isolating the machine to prevent the effect of outside interference.
- Sound-insulating the machine with suitable sound insulation and absorbing material to combat airborne noise.



SPHERILASTIK™

A cost-effective cure

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

Rubber springs to the rescue

Vibration isolation is based on installing machinery on springs or resilient material of known stiffness and damping. The most commonly used spring materials are rubber and steel. Another alternative is air springs. However, the properties of rubber make it particularly suitable as a spring material, as it has:

- A high load bearing capacity with an ability to accommodate overload conditions without the catastrophic failures associated with steel and other materials.
- The ability to carry complex loadings more easily and economically than other alternatives. By bonding rubber to a rigid material, a product can be created to accommodate movement with no sliding or rotating surfaces that require lubrication. This allows operation in many harsh environments with substantially reduced maintenance requirements.

Components can be designed to integrate with the space limitations of the application and provide control in all six modes of freedom. Steel springs are normally used in the form of coil springs or leaf springs. Although steel springs permit relatively high deflections, they provide very little damping. Consequently, excessive movement occurs when passing through the resonance range. Often special devices are installed in order to limit deflections. To allow their properties to be utilized in a satisfactory way, Trelleborg Industrial AVS rubber mountings are available in various hardness grades and polymer types.

VIBRATION THEORY

Rubber as an engineering material

Compared with other engineering materials,rubber is very ductile. In some cases,the elongation may be higher than 1000%, and by far the highest proportion of this strain is elastic. Metals,on the other hand,have very small strains below the elastic limit. Compared with metals, the tensile strength of rubber is low. The maximum level that can be achieved with rubber is 25-30 MPa. However, because of the high straincapability, rubber has a very large work absorption capacity compared with the best grade of steel. If a material is subjected to a load below the elastic limit, the deformation will, according to Hooke ´s law, be proportional to the load. This does not apply to rubber under tension or compression. This means that rubber does not have any constant tensile or compression modulus of elasticity. Rubber does not have a yield point, and the modulus is increased until there is abrupt failure.

The most important properties for rubber

High elasticity

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

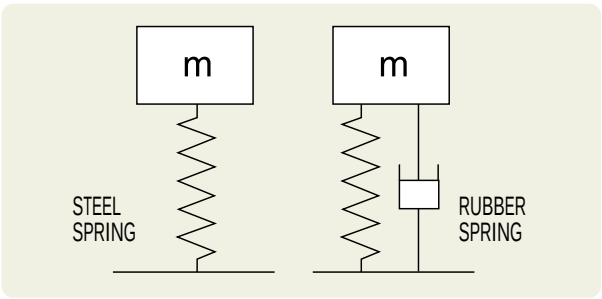


FIG.3. Schematic difference between rubber spring and steel spring.

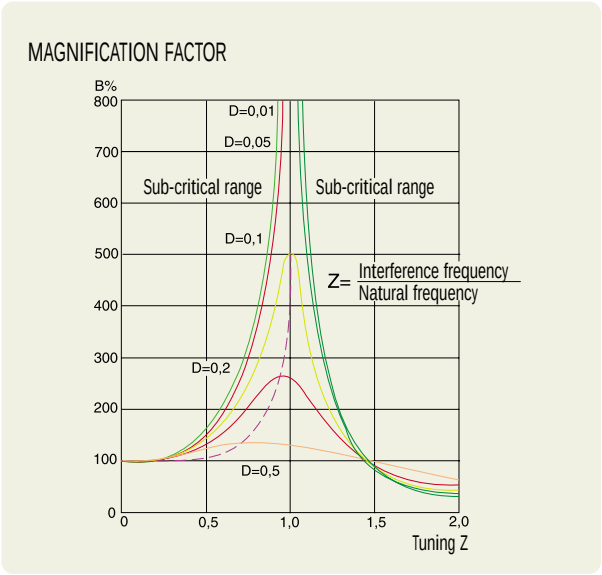


FIG.4. Resonance curve for spring material with different internal damping.

Damping capacity

Damping capacity is an additional important feature of compounded rubber.

Sound-insulating

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

Environmental Conditions

Trelleborg products are manufactured in a wide range of rubber compound types. A range of hardnesses is available in each compound type to allow the required stiffness to be achieved. Each compound is carefully formulated to obtain the best performance for specific properties. The compound chosen depends upon the most important properties for the application' requirement. Strength and fatigue requirements, operating temperature, environmental conditions and poten-

tial contaminates must be considered. Most Trelleborg rubber compounds are based on natural rubber compunds, offering high strength and excellent performance characteristics. A range of synthetic rubber compounds is also available for special applications where resistance to continuous high temperatures (>60 °C) or other harsh environmental conditions is required. Anti-oxidants and anti-ozonants are included in many formulations to provide resistance against ozone and ultra violet rays.

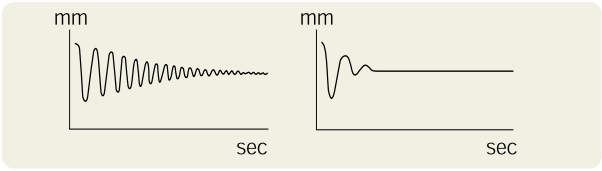


FIG.5. Response of single impact applied to steel and rubber springs.

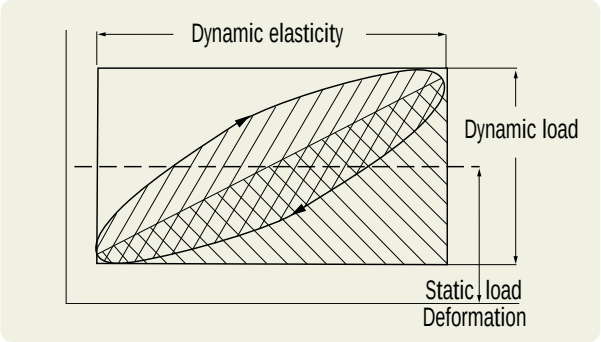


FIG.6. Schematic representation of the internal damping properties of rubber. The elliptical area indicates the loss of energy.

Spring coefficients

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

Static Stiffness

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

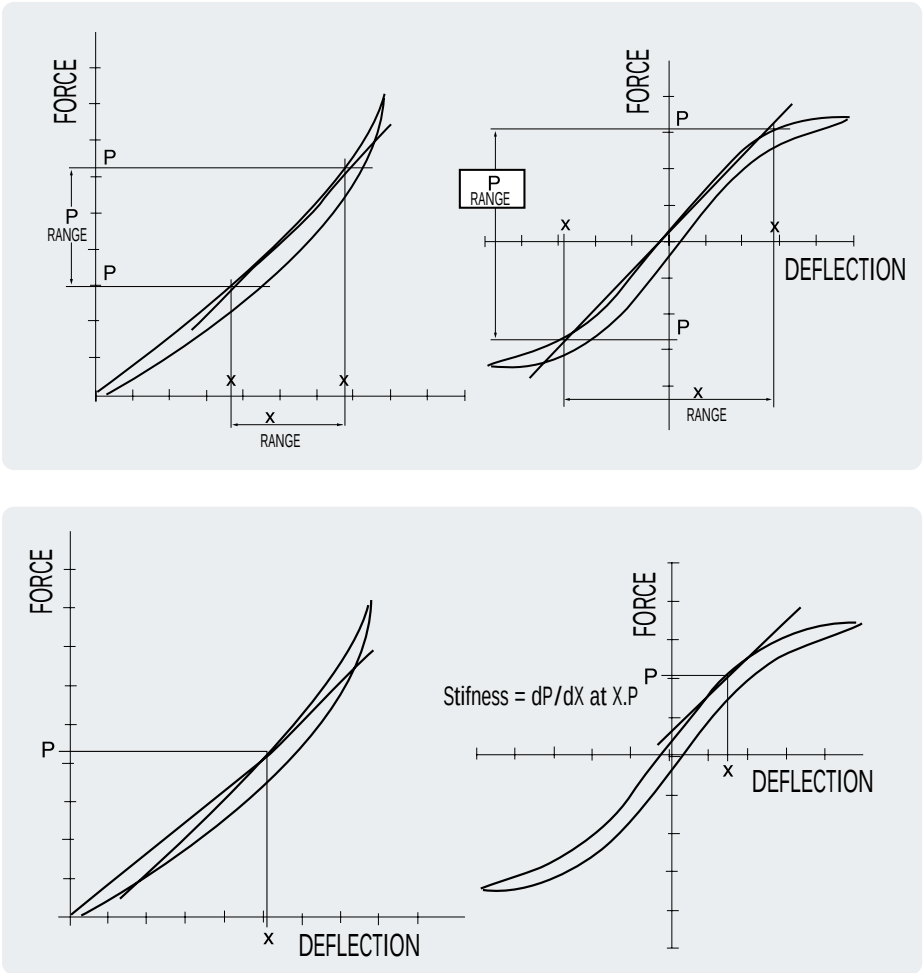


FIG.7. dP/dX at XP average gradient over P (or X) range (usually derived by least squares method of curve fitting).

Dynamic Stiffness

The stiffness of a rubber spring changes when a dynamic force is applied. This is known as the dynamic (or complex) stiffness. The dynamic stiffness is usually higher than the pseudo-static stiffness, (the difference being referred to as the dynamic to static ratio) and is affected by several factors including changes in frequency, temperature and amplitude. See fig. 8. The dynamic stiffness is considered to be unchanged between 5Hz and 80Hz under constant conditions. Above this frequency range, the dynamic stiffness of the spring will deviate from the ideal 'massless 'spring stiffness. This is due to the mass effects of standing waves. "Wave effect "changes of dynamic stiffness are generated when the rubber section dimensions become comparable with multiples of the half wavelength of the propagated wave passing through the spring. Calculations of the deviation from ideal "massless " spring dynamic stiffness due to wave effect are complex and are normally obtained from test measurement. A typical stiffness curve for a large section rubber to metal bonded spring is shown below. In fig. 9.

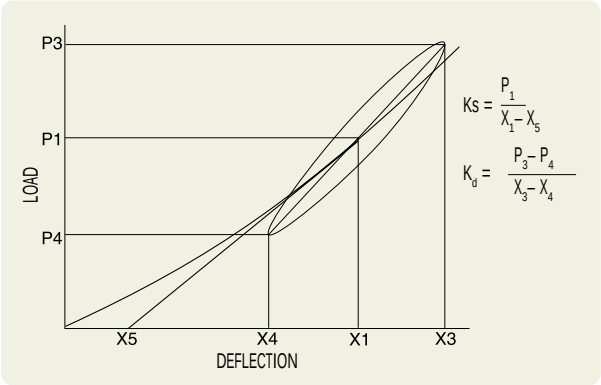


FIG.8

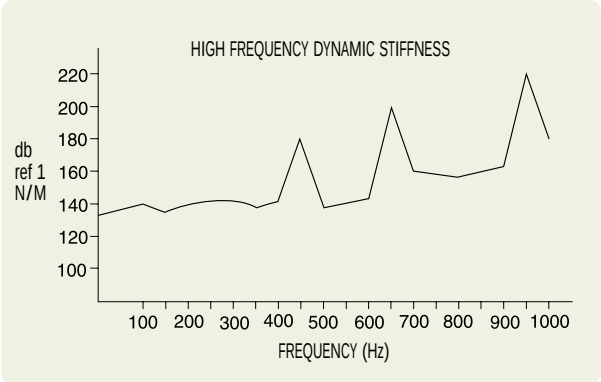


FIG.9

Creep Performance

When a rubber spring is subjected to a constant load, the resultant deflection continues to increase with time. An example of creep that occurs in a pair of inclined springs is shown on the graph in fig.10. A typical creep characteristic for rubber used in antivibration mountings is 3-5% per time decade.

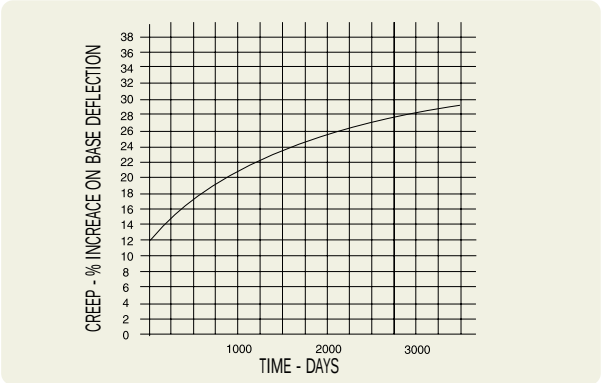


FIG. 10

Joule effect

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

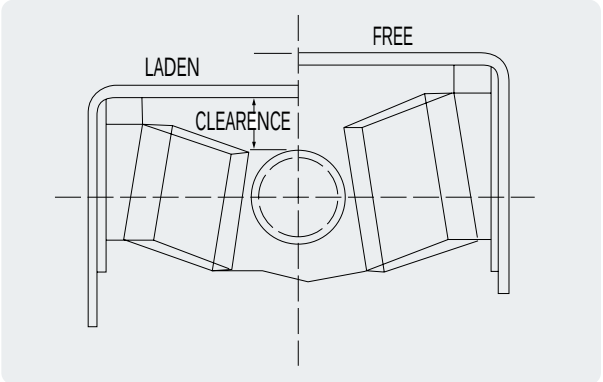


FIG. 11

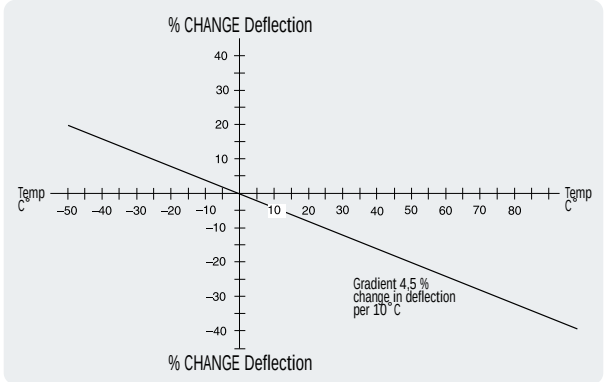


FIG. 12

Stiffnes of a rubber spring

When calculating compression characteristics of rubber, it should be noted that the deflection is not directly proportional to the load, as the modulus of elasticity in compression increases with the degree of stress. The modulus of shear, however, remains constant for normal stresses. The factor with the most effect on stiffness is the ratio between loaded and free surface area of rubber. This is the so-called shape factor (often designated S). With thin rubber sections,a very high modulus of elasticity can be achieved. The stiffness of a rubber spring is also determined by the dimensions and the hardness of the rubber. Fig. 13 illustrates the relationship between rubber hardness and shear modulus, and Fig.14 the dependence of the bulk modulus on the shape factor. The latter curve applies at 10% deformation. The curves show that rubber at a shape factor of 0.25 for shear i about 6-8 times softer than compression for the same rubber hardness. Since only 3-4 times the stress value in compression can be considered, it may be said that rubber is best used in shear to achieve large deflections and good isolation properties, particularly at low interference frequencies.

Selection of antivibration mountings

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

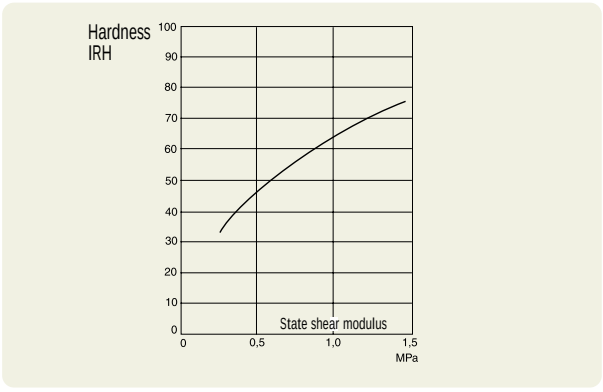


FIG.13 Relationship between rubber hardness and shear modulus.

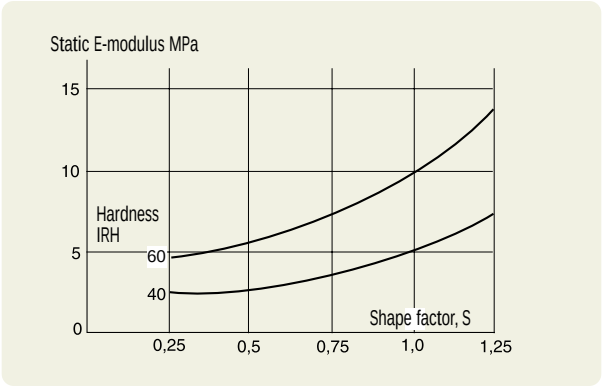


FIG.14 The dependence of the compression modulus upon the shape factor.

SOME VIBRATION DEFINITIONS

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

Calculation of deflection

When calculating deflection the following formula shall be used.

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

Calculation of isolation degree

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

The natural frequency:

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

Tuning: $Z = f/f_0$

Magnification factor:

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

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

Isolation degree I= (1-B) or as percentage, I= (1-B) x 100

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

The relative magnitude of the transmission of force depends primaeily on the tuning ratio Z. If Z is high, the force transmission percentage will be small. As can be seen in fig.15,B at $Z = \sqrt{2}$ has dropped to 100% and when Z is further increased, B drops rapidly. Vibration isolation is therefore of significance first when the operating frequency considerably exceeds the natural frequency. For practical applications, Z should be between 3 and 5, which means that 88 to 96 % of interference forces are eliminated. Generally, the operating speed of a machine (interference frequency) is given. If the system´s natural frequency can be modified, and influence Z, it is possible to change the force transmitted.This is exactly what happens when vibration isolation is achieved. The low elasticity and shear moduli of rubber are used to achieve a low natural frequency.

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

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

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

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

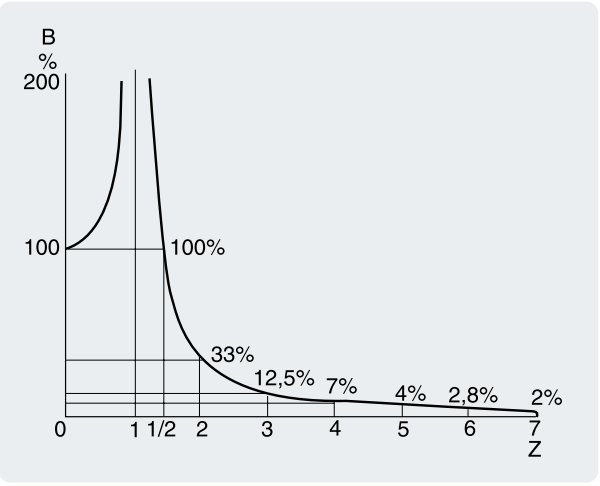


FIG.15 Resonance curve.

Shock isolation

Shock is usually described as a transient phenomenon as opposed to a vibration, which is a contin uous process. A shock pulse can normally by described by parameters such as maximum amplitude (acceleration, for example), duration (in milliseconds, for example), and the shape of the pulse. The pulse may be a half sine wave, rectangular, saw tooth or other shape of wave. The basic principle for achieving good shock isolation is to mount the machine on mountings that are soft enough to give a low natural frequency, and which can offer relatively large mounting deflections. If the duration of a shock pulse is τ seconds, and the natural frequency of the set up is f_n Hz, then the product must be τf_n <approx. 0.25 if the isolation is to provide protection against the shock. The value 0.25 is not an absolute value but depends on the shape of the shock pulse.

Movements

Generally, softer suspension systems give a lower Natural Frequency and more static deflection than stiff mounting systems. A low system Natural Frequency will give good vibration isolation performance, but the high deflections may result in undesired excessive movements of the mounted equipment under normal working conditions. One solution to decrease undesired movement is to increase the stiffness of the mounting, but then it becomes a compromise between low Natural Frequency (isolation performance) and acceptable equipment movements. An alternative option is to install a buffer system to reduce the movement in the direction that causes a problem. If in doubt please don´t hesitate to contact local sales office.

Storage

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

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

Unit conversion

Multiply	*by*	*to obtain*
feet	0.30480	meters
inches	25,4	millimeters
pounds	0.453	kilograms
pound/force	4.4482	Newtons
feet second	0.3048	meters/second
inches/second	0.0254	meters/second
feet/second^2	0.3048	meters/second^2
inches/second^2	0.0254	meters/second^2

ASSISTANCE GUIDE WHEN CHOOS

CONSTRUCTION EQUIPMENT

	PRODUCT	APPLICATION	PAGE
	MDS MOUNTING	ENGINE, CAB	**16**
	METACONE™	ENGINE, CABIN, RADIATOR	**18**
	HYDROMOUNTING	CAB	**26**
	COMPACTOR SHEARMOUNTING	VIBRATORY COMPACTORS	**27**
	CUSHYFLOAT™ SPECIAL	ENGINE	**28**
	CAB MOUNTING	ENGINE, CAB	**30**
	2-PIECE CR MOUNTING	ENGINE ,CAB	**32**
	EH	ENGINE ,CAB, RADIATOR	**34**
	MUSHROOM	ENGINE, CAB, RADIATOR	**36**
	SPHERILASTIK™	SUSPENSION	**39**
	CONTROL LINK	SUSPENSION	**40**
	CONICAL BEARING	SUSPENSION	**41**
	SUSPENSION SPRING	SUSPENSION	**42**

AGRICULTURE

	PRODUCT	APPLICATION	PAGE
	MDS MOUNTING	ENGINE, CAB	**16**
	METACONE™	ENGINE, CAB, RADIATOR	**18**
	HYDROMOUNTING	CABIN	**26**

SING ANTIVIBRATION MOUNTING

	CABMOUNTING	ENGINE, CAB	**30**
	2-PIECE CR MOUNTING	ENGINE ,CAB	**32**
	EH	ENGINE, CAB, RADIATOR	**34**
	MUSHROOM	ENGINE, CAB, RADIATOR	**36**
	SPHERILASTIK™	SUSPENSION	**39**
	CONTROL LINK	SUSPENSION	**40**
	CONICAL BEARING	SUSPENSION	**41**

MATERIAL HANDLING

PRODUCT	APPLICATION	PAGE
MDS MOUNTING	ENGINE	**16**
METACONE™	ENGINE, CAB, RADIATOR	**18**
HYDROMOUNTING	CAB	**26**
CUSHYFLOAT™ SPECIAL	ENGINE	**28**
CAB MOUNTING	ENGINE, CAB	**30**
2-PIECE CR MOUNTING	ENGINE ,CAB	**32**
EH	ENGINE ,CAB, RADIATOR	**34**
MUSHROOM	ENGINE, CAB, RADIATOR	**36**
SPHERILASTIK™	SUSPENSION	**39**

TRELLEXTREME™ type MDS

The MDS mounting is designed to take high dynamic shock loads but to limit mount movements in all directions, MDS=Multi Directional Snubbing.

In the static working load range, the MDS mounts have linear stiffness characteristics allowing easy prediction of mount deflection and isolation performance. (see fig. 1)

– Typical applications: Engines and small cabs on off-highway vehicles.

Features

The MDS mounting is easy to install based on a 2 part single bolt installation. There is no requirement for radius or chamfered installation hole and a steel flange prevents rubber wear at the bracket interface. The bonded steel snubbing cup limits vertical movements and prevents excessive strain in rubber. The cup is encapsulated in rubber to prevent corrosion.

A rubber rim holds the lower mount half in the hole during assembly.

– Vertical dynamic snubbing +/- 6 mm.
– Horizontal dynamic snubbing +/- 3 mm.
– Static vertical load range 70-200 kg.
– Deflection at max static load 2.5 mm.
– Axial to radial stiffness ratio 1.5:1.

TYPICAL STATIC AXIAL (VERTICAL) STIFFNESS MDS 80/3820
(Assembled in pairs, with upper and lower washers 19-20 mm thick plate, 38 mm dia. hole)

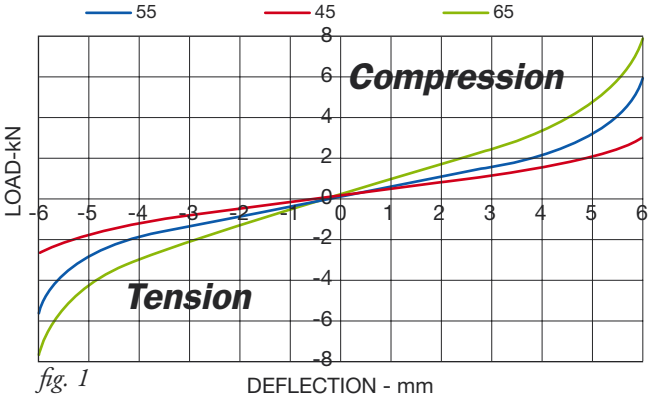
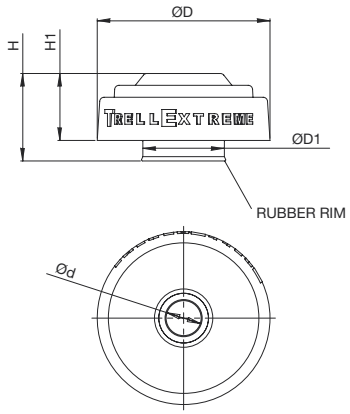
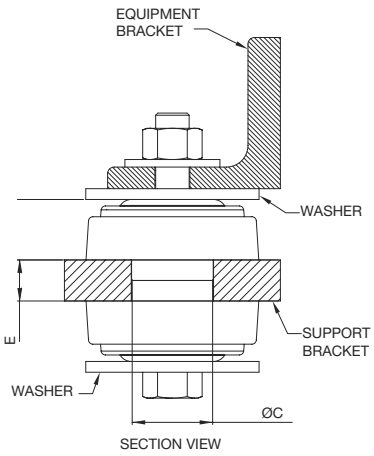


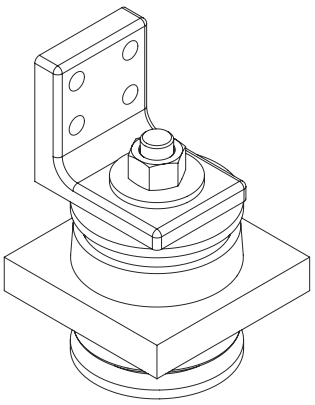
fig. 1

MDS MOUNT



TYPICAL INSTALLATION





More product and model information are available upon request.

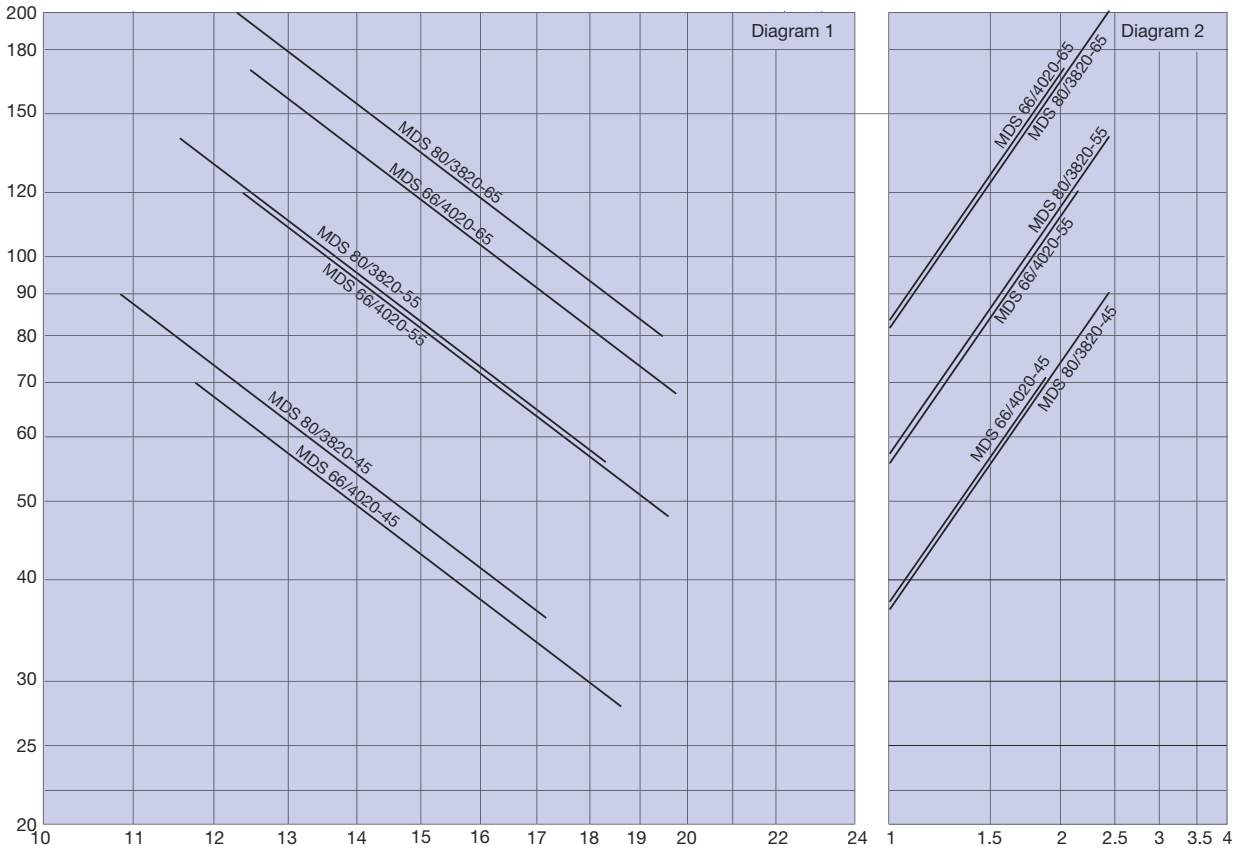
See below table showing our principal sizes and models. Part listed are a selection of a wider range, details of which are available on request. Please contact our Off Highway Applications department for further advise.

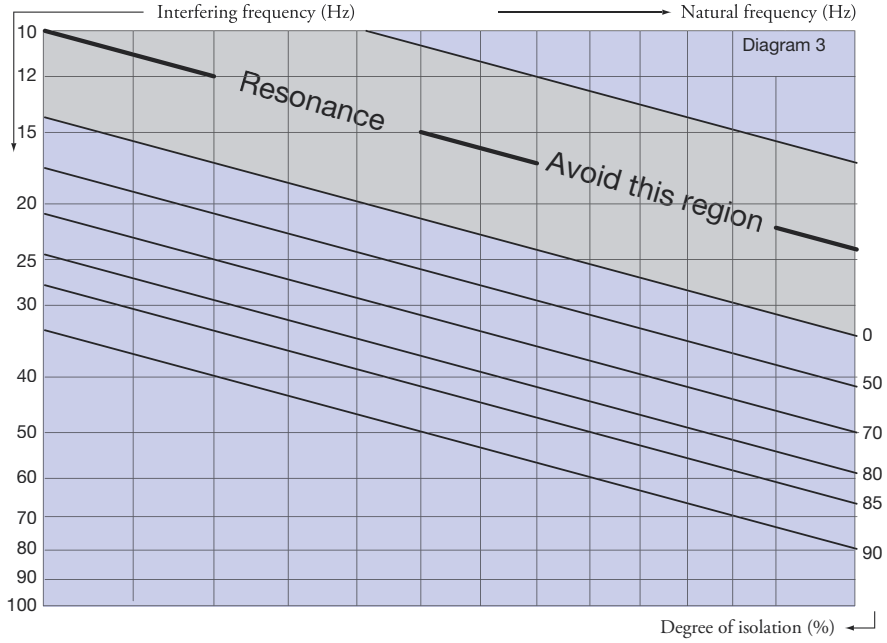
Type	Dimension (mm) d	D	D1	H	H1	C	E	Bolt Size	Max. Bolt Torque Nm	Max. Load kg
MDS 80/3820-45	16,2	80	37,8	40,5	31	38	19/20	M16	240	90
MDS 80/3820-55	16,2	80	37,8	40,5	31	38	19/20	M16	240	140
MDS 80/3820-65	16,2	80	37,8	40,5	31	38	19/20	M16	240	200
MDS 66/4020-45	18,8	66	39,8	38	28,5	40	19/20	M16	240	70
MDS 66/4020-55	18,8	66	39,8	38	28,5	40	19/20	M16	240	120
MDS 66/4020-65	18,8	66	39,8	38	28,5	40	19/20	M16	240	170

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

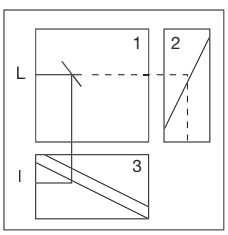
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Metacone™ & HK

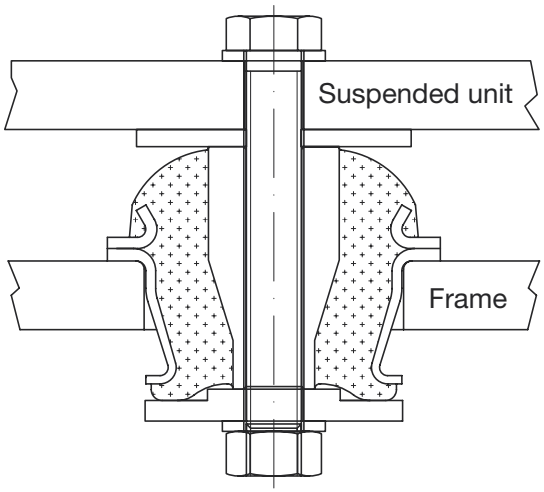
Metacone™ and HK

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

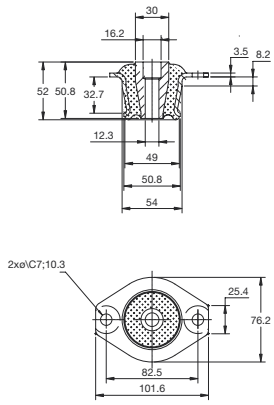
Features

A compact fail safe design, available for a wide range of loading with in some cases alternative fixings.
Cutouts in rubber section on various sizes provide different vertical/horizontal stiffness ratios.

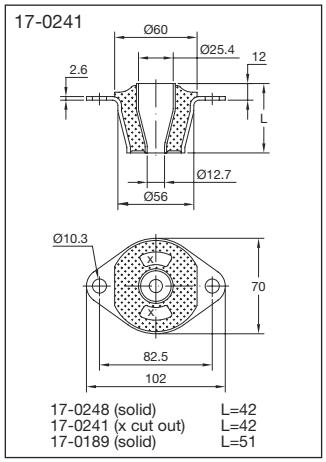
Installation



17-1690

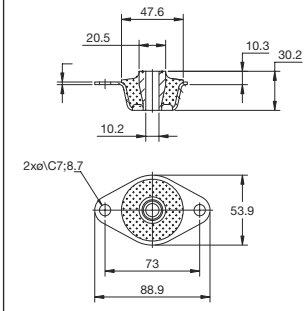


17-0241

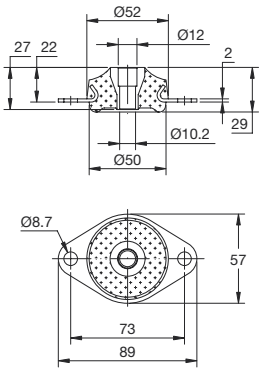


17-0248 (solid) L=42
17-0241 (x cut out) L=42
17-0189 (solid) L=51

17-1629



17-0379



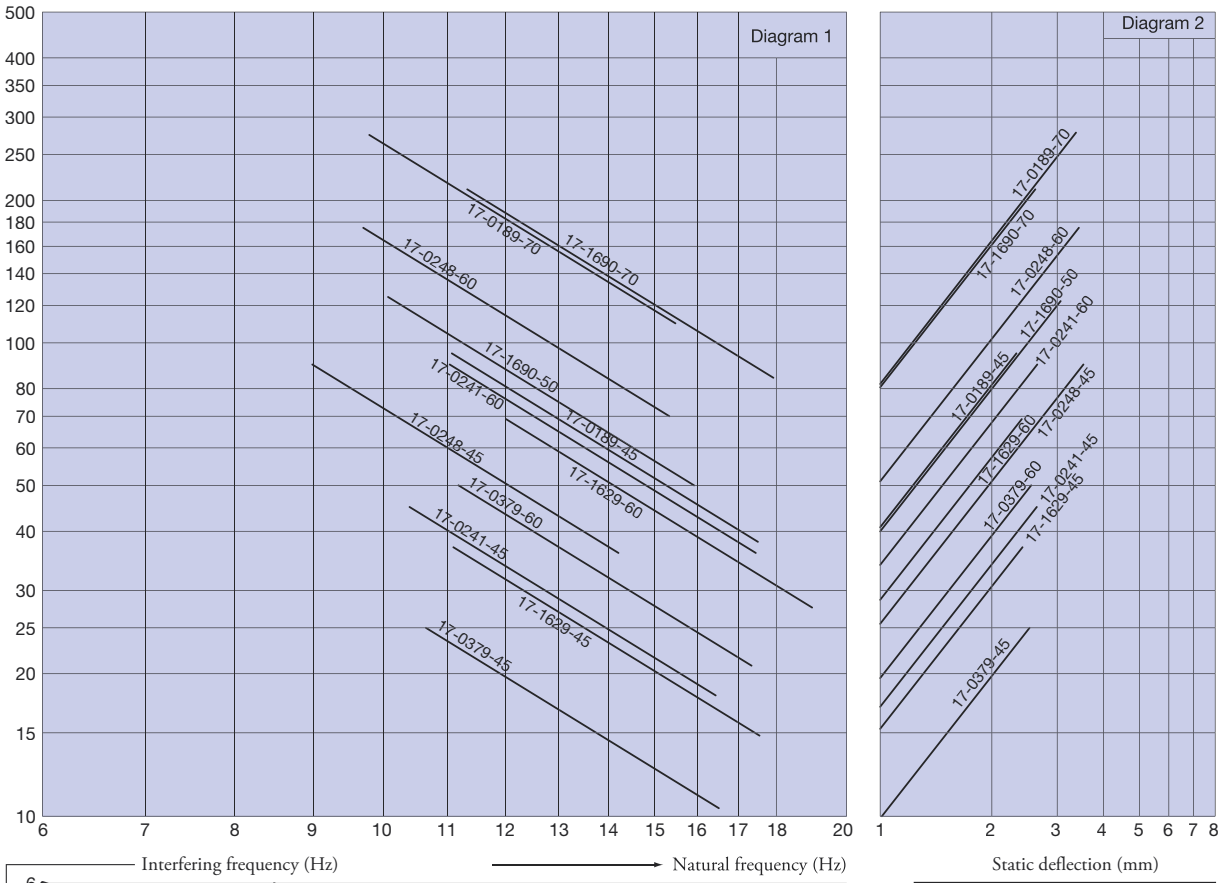
Type	Part no.	Bolt Size	Max. Bolt Torque Nm	Max* Load kg	Top Washer Part no.	Bottom Washer Part no.
17-0189-45	10-00365-01	M12	40	95	20-00529-01	20-00038-01
17-0189-70	10-00367-01	M12	40	275	20-00529-01	20-00038-01
17-0241-45	10-00374-01	M12	40	45	20-00529-01	20-00038-01
17-0241-60	10-00375-01	M12	40	90	20-00529-01	20-00038-01
17-0248-45	10-00379-01	M12	40	90	20-00529-01	20-00038-01
17-0248-60	10-00380-01	M12	40	175	20-00529-01	20-00038-01
17-0379-45	10-00402-01	M10	25	25	20-00531-01	20-00531-01
17-0379-60	10-00404-01	M10	25	50	20-00531-01	20-00531-01
17-1629-45	10-00941-01	M10	25	35	20-00531-01	10-03724-01
17-1629-60	10-00942-01	M10	25	65	20-00531-01	10-03724-01
17-1690-50	10-00752-01	M12	90	125	20-00416-01	20-00536-01
17-1690-70	10-00751-01	M12	90	210	20-00416-01	20-00536-01

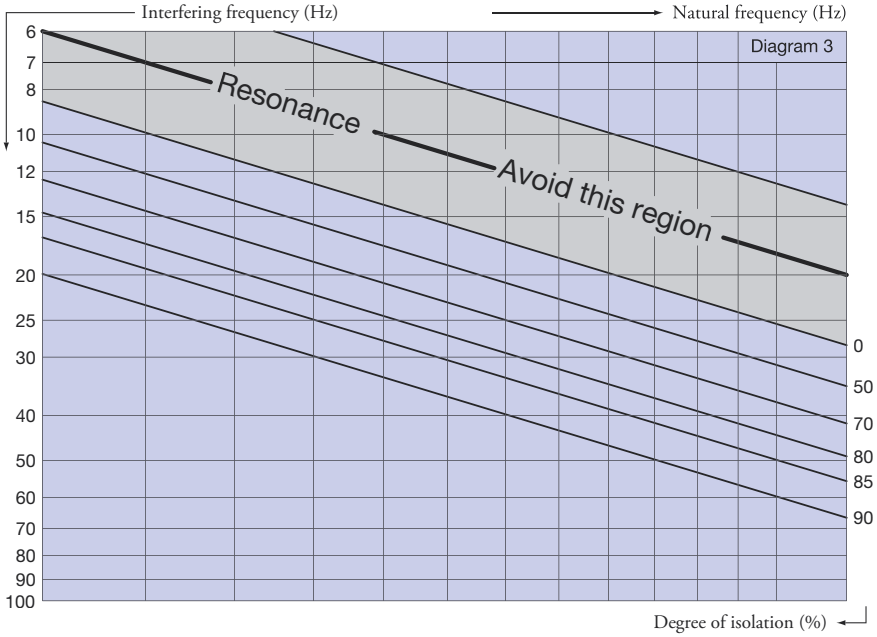
(*) Max. loads have been calculated for extreme off-highway use, these are lower values than shown in the industrial catalogue.

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

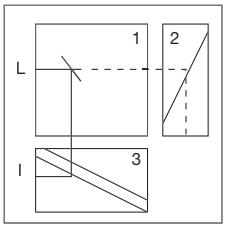
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





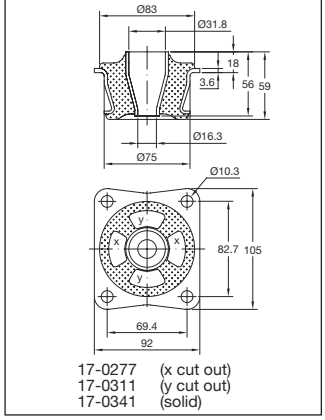
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically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



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

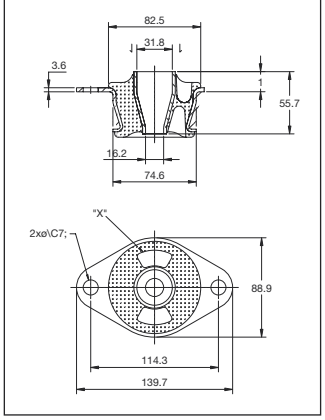
Metacone™ & HK

17-0341

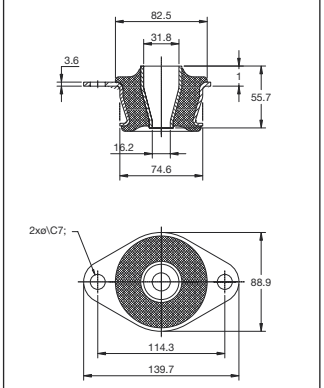


17-0277 (x cut out)
17-0311 (y cut out)
17-0341 (solid)

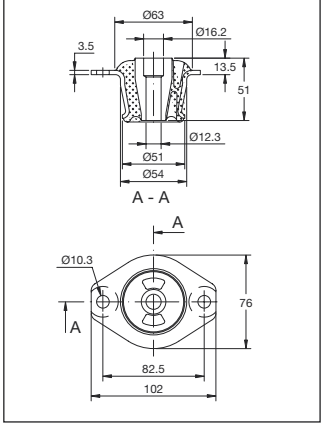
17-0276



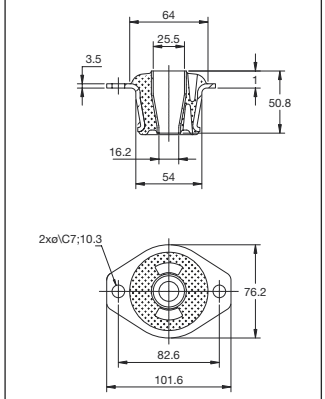
17-0285



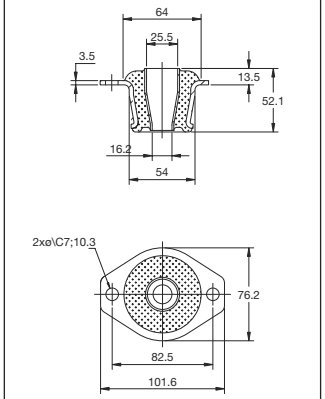
17-1691



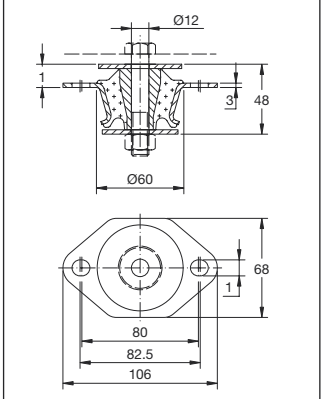
17-0479



17-0472



HK60



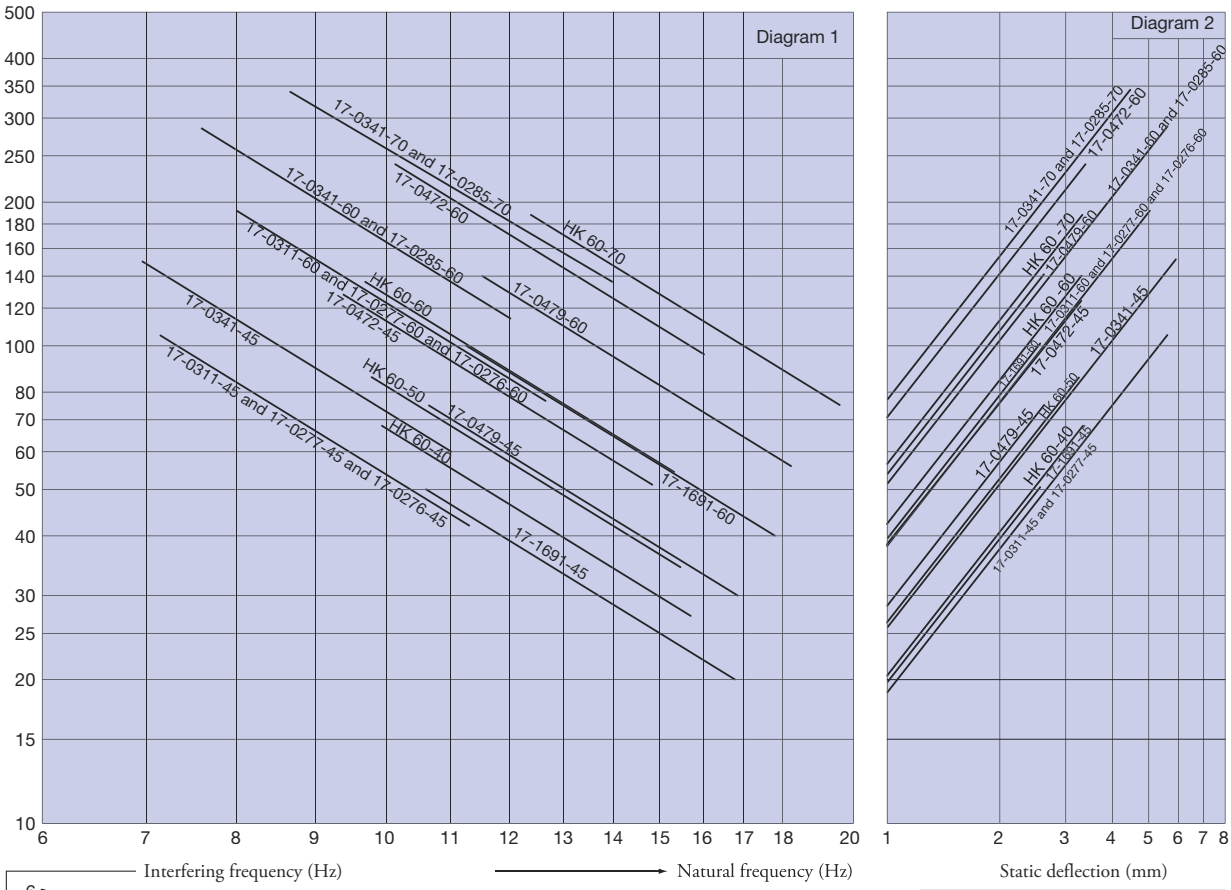
Type	Part no.	Bolt Size	Max. Bolt Torque Nm	Max* Load kg	Top Washer Part no.	Bottom Washer Part no.
17-0276-45	10-03397-01	M16	75	105	20-00773-01	20-00532-01
17-0276-60	10-02969-01	M16	75	190	20-00773-01	20-00532-01
17-0277-45	10-00385-01	M16	75	105	20-00773-01	20-00532-01
17-0277-60	10-00387-01	M16	75	190	20-00773-01	20-00532-01
17-0285-60	10-00389-01	M16	75	285	20-00773-01	20-00532-01
17-0285-70	10-00390-01	M16	75	340	20-00773-01	20-00532-01
17-0311-45	10-00391-01	M16	75	105	20-00773-01	20-00532-01
17-0311-60	10-00392-01	M16	75	190	20-00773-01	20-00532-01
17-0341-45	10-00394-01	M16	75	150	20-00773-01	20-00532-01
17-0341-60	10-00395-01	M16	75	285	20-00773-01	20-00532-01
17-0341-70	10-00396-01	M16	75	340	20-00773-01	20-00532-01
17-0472-45	10-00420-01	M16	50	125	20-00529-01	20-00038-01
17-0472-60	10-00904-01	M16	50	235	20-00529-01	20-00038-01
17-0479-45	10-00711-01	M16	50	75	20-00529-01	20-00038-01
17-0479-60	10-00712-01	M16	50	140	20-00529-01	20-00038-01
17-1691-45	10-00566-01	M12	90	50	20-00416-01	20-00536-01
17-1691-60	10-00567-01	M12	90	100	20-00416-01	20-00536-01
HK 60-40	10-00186-01	M12	40	65	20-00416-01	20-00416-01
HK 60-50	10-00058-01	M12	40	85	20-00416-01	20-00416-01
HK 60-60	10-00187-01	M12	40	135	20-00416-01	20-00416-01
HK 60-70	10-00057-01	M12	40	190	20-00416-01	20-00416-01

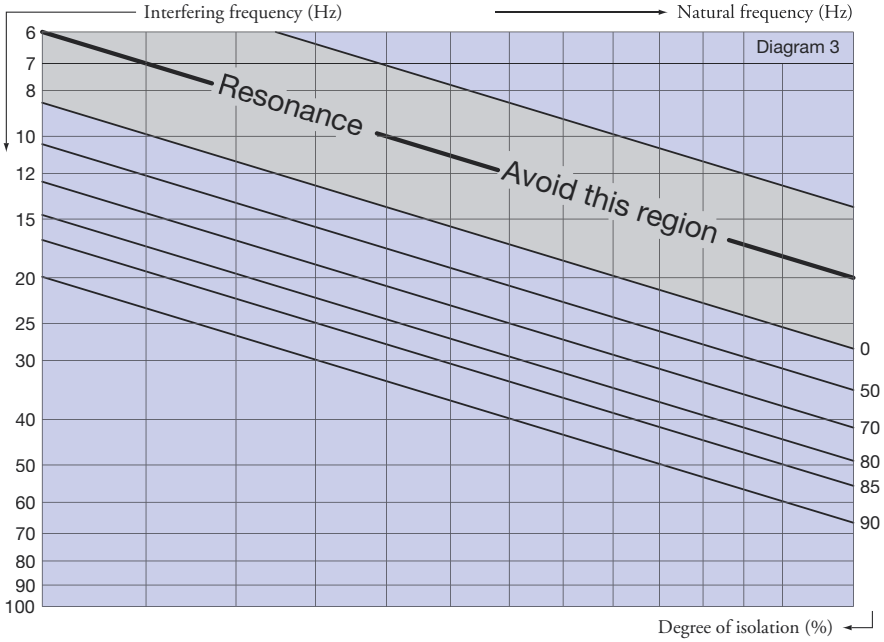
(*) Max. loads have been calculated for extreme off-highway use, these are lower values than shown in the industrial catalogue.

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

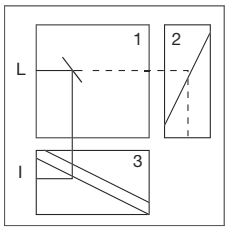
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





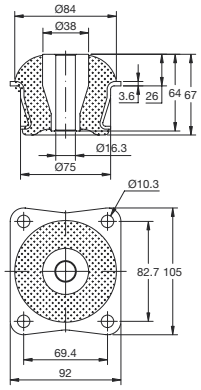
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically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



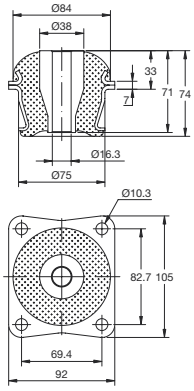
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Metacone™ & HK

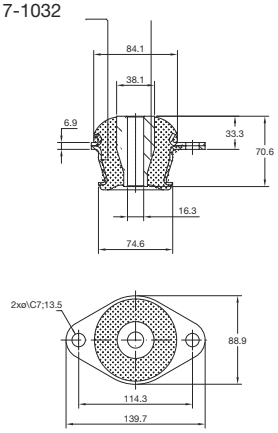
17-0566



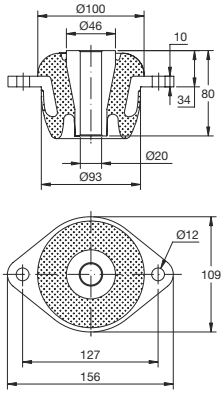
17-0391



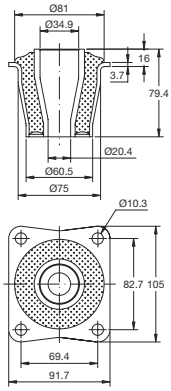
17-1032



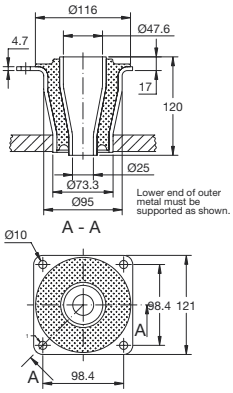
17-1843



17-1227



17-0146



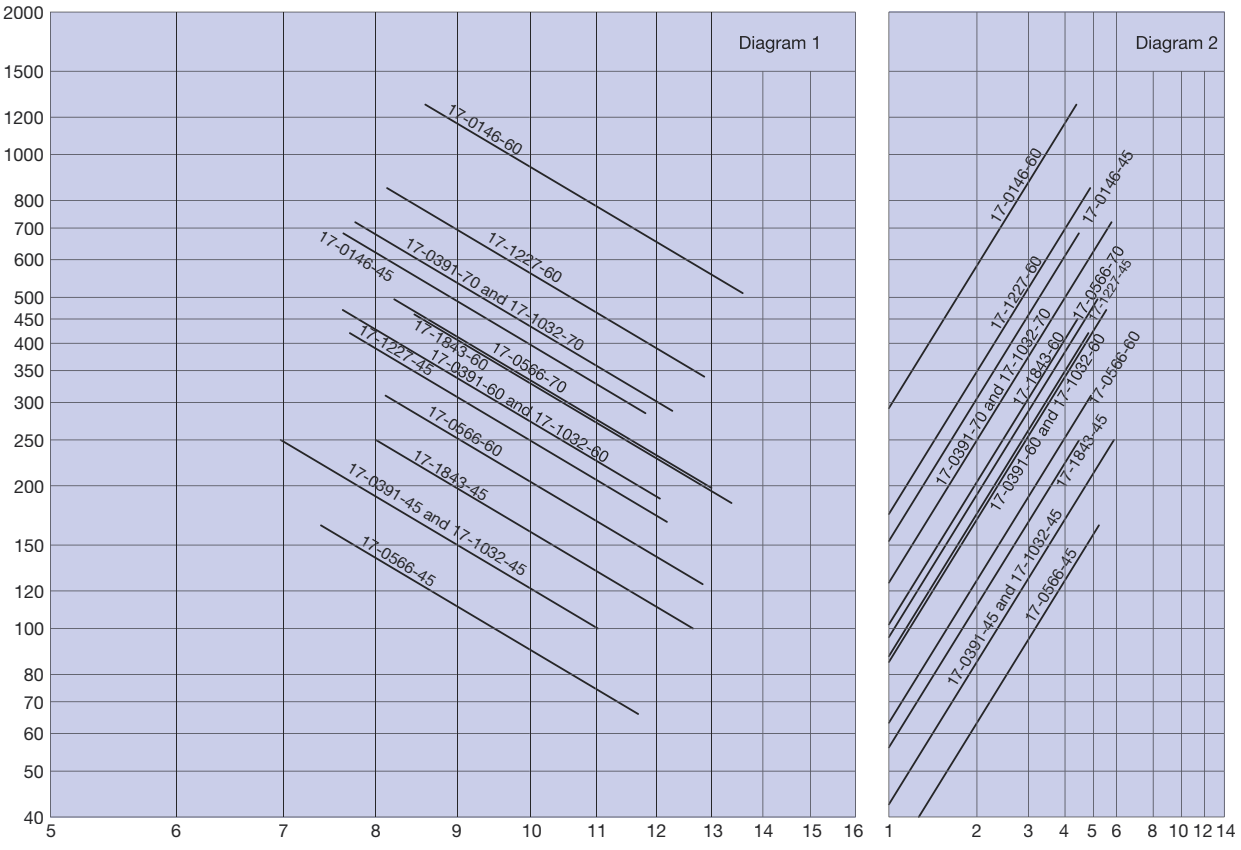
Type	Part no.	Bolt Size	Max. Bolt Torque Nm	Max* Load kg	Top Washer Part no.	Bottom Washer Part no.
17-0146-45	10-00360-01	M24	200	685	20-00527-01	20-00031-01
17-0146-60	10-00361-01	M24	200	1285	20-00527-01	20-00031-01
17-0391-45	10-00411-01	M16	135	250	20-00532-01	20-00532-01
17-0391-60	10-00414-01	M16	135	470	20-00532-01	20-00532-01
17-0391-70	10-00415-01	M16	135	720	20-00532-01	20-00532-01
17-1032-45	10-02905-01	M16	135	250	20-00532-01	20-00532-01
17-1032-60	10-02977-01	M16	135	470	20-00532-01	20-00532-01
17-1032-70	10-03726-01	M16	135	720	20-00532-01	20-00532-01
17-0566-45	10-00433-01	M16	135	165	20-00532-01	20-00532-01
17-0566-60	10-00434-01	M16	135	310	20-00532-01	20-00532-01
17-0566-70	10-00435-01	M16	135	495	20-00532-01	20-00532-01
17-1227-45	10-00459-01	M20	180	425	20-00528-01	20-00036-01
17-1227-60	10-00460-01	M20	180	850	20-00528-01	20-00036-01
17-1843-45	10-00609-01	M24	160	250	20-00533-01	20-00533-01
17-1843-60	10-00610-01	M24	160	460	20-00533-01	20-00533-01

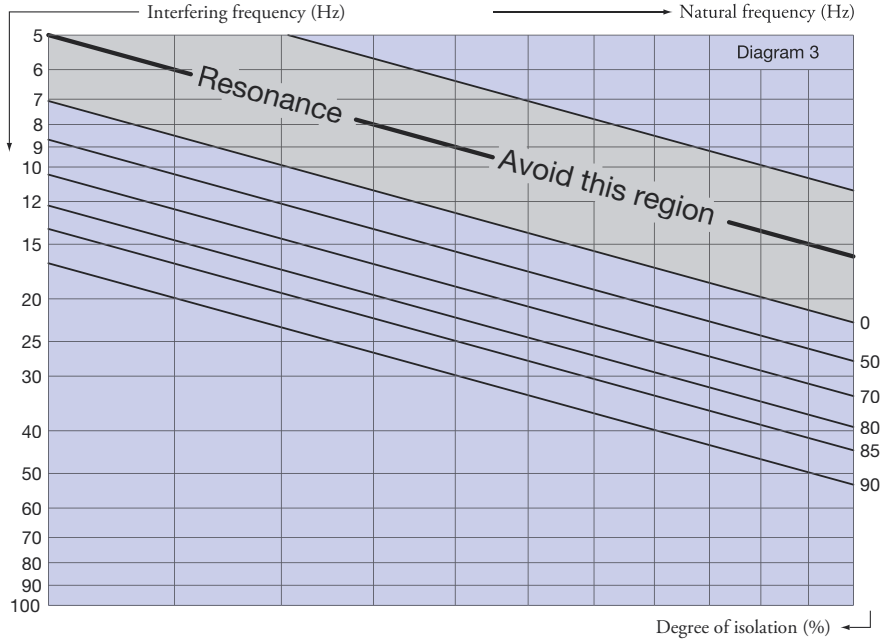
(*) Max. loads have been calculated for extreme off-highway use, these are lower values than shown in the industrial catalogue.

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

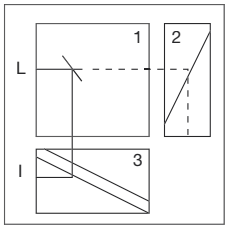
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





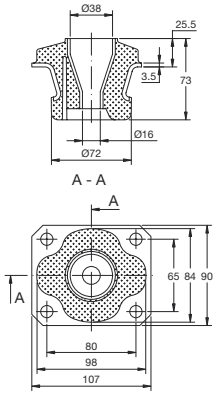
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically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



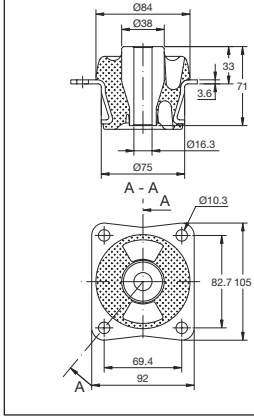
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Metacone™ & HK

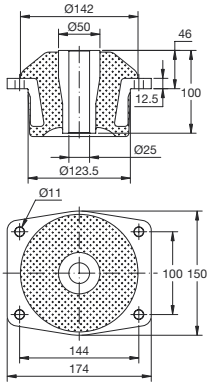
11-1009



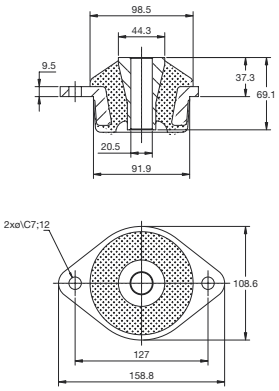
17-1865



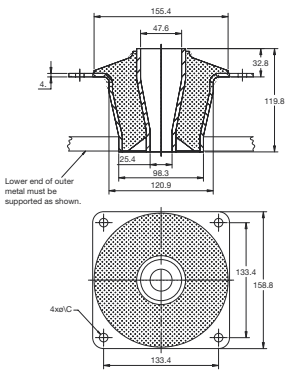
17-1550



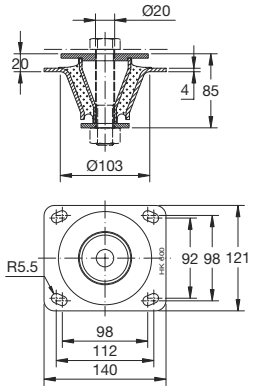
17-1101



17-0168



HK 600



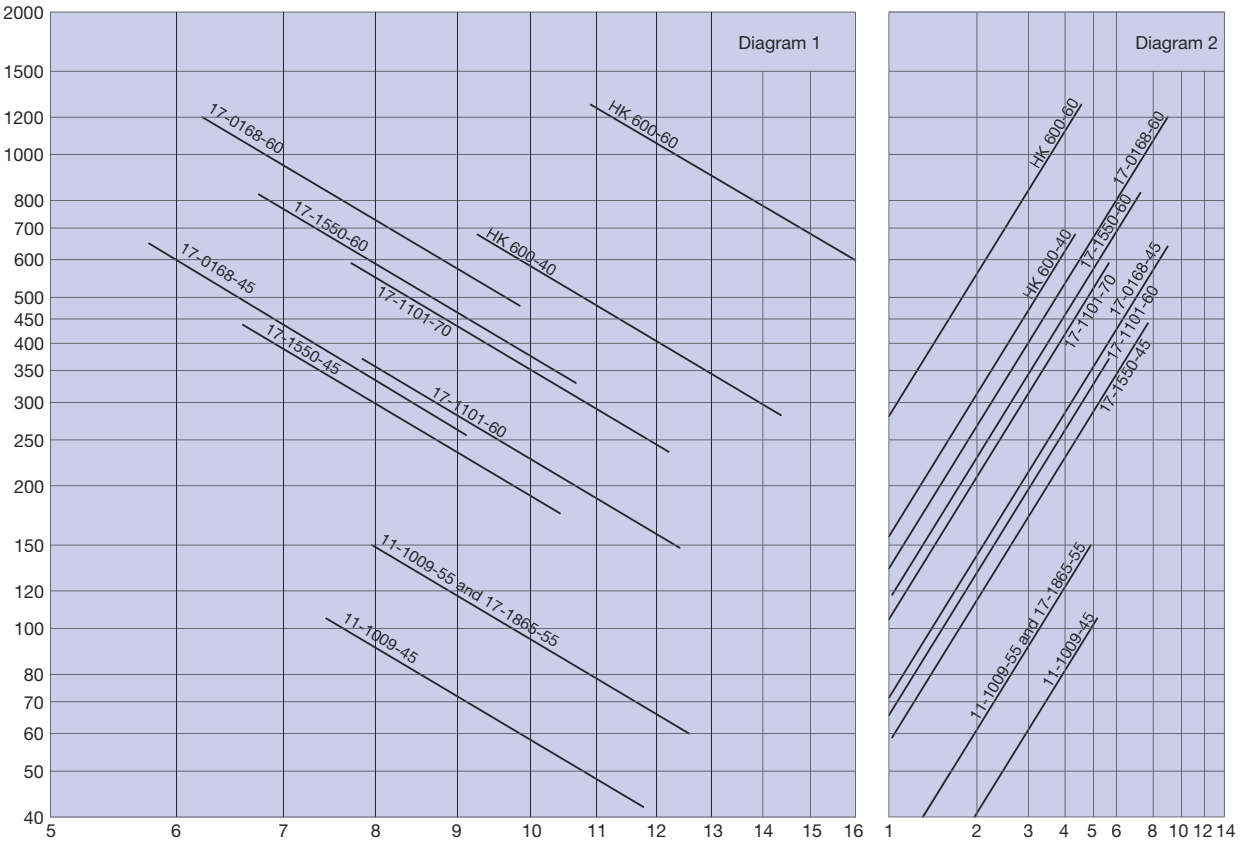
Type	Part no.	Bolt Size	Max. Bolt Torque Nm	Max* Load kg	Top Washer Part no.	Bottom Washer Part no.
11-1009-45	10-00192-01	M16	75	105	20-00532-01	20-00532-01
11-1009-55	10-00193-01	M16	75	150	20-00532-01	20-00532-01
17-0168-45	10-00363-01	M24	200	640	20-00527-01	20-00031-01
17-0168-60	10-00364-01	M24	200	1200	20-00527-01	20-00031-01
17-1101-60	10-00721-01	M20	160	365	20-00533-01	20-00533-01
17-1101-70	10-02978-01	M20	160	585	20-00533-01	20-00533-01
17-1550-45	10-00522-01	M24	260	435	20-00534-01	20-00534-01
17-1550-60	10-00523-01	M24	260	820	20-00534-01	20-00534-01
17-1865-55	10-00615-01	M16	135	150	20-00532-01	20-00532-01
HK 600-40	10-00190-01	M20	120	685	20-00643-01	20-00644-01
HK 600-60	10-00191-01	M20	120	1260	20-00643-01	20-00644-01

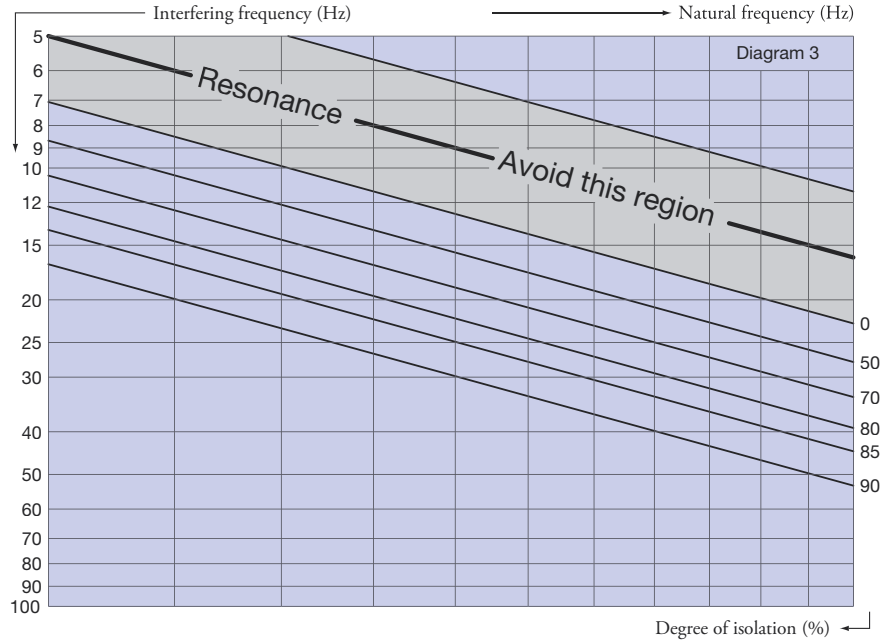
(*) Max. loads have been calculated for extreme off-highway use, these are lower values than shown in the industrial catalogue.

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

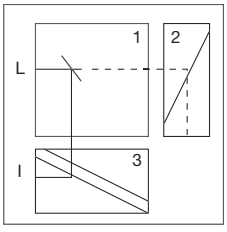
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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



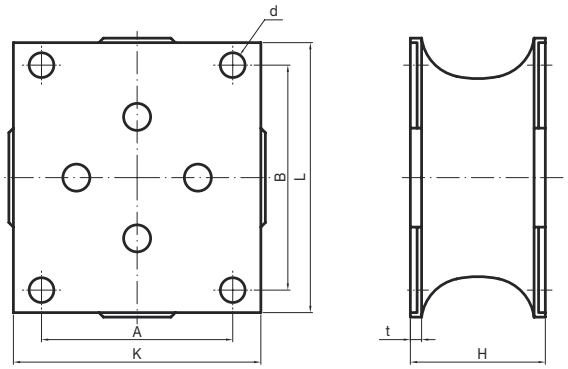
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Trellextreme™ Compactor Shearmountings support high compressive loads with low shear stiffness.
They are suitable for suspension of vibratory compactor drums on compactor roller vehicles and vibratory screen equipment.

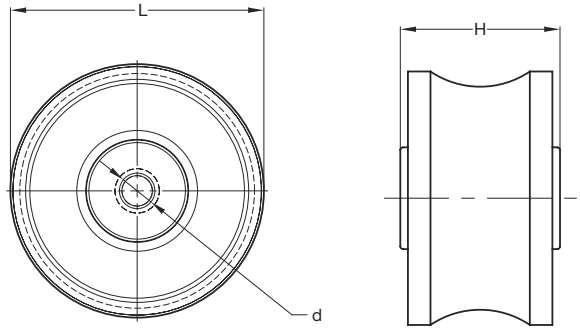
Features

- High tensile strength superior grade rubber compounds bonded to steel mounting plates.
- Compact and easy to install, maintenance free.
- Can be used in pairs in an angled arrangement, loaded in combined compression and shear to optimize vibration isolation performance.

2 “& 3”



BR 3.00



2 & 3” shear / compression Mountings

Type	Part no.	Dimension							Compression		Shear		weight
		A	B	K	L	H	d	t	Max load (kg)	deflection (mm)	Max load (kg)	deflection (mm)	kg
2” -55	10-01798-01	100	85	120	110	60	11	5	670	9	70	7,5	1,1
2” -60	10-01618-01	100	85	120	110	60	11	5	840	9	90	7,5	1,1
2” -65	10-01619-01	100	85	120	110	60	11	5	1010	9	100	7,5	1,1
3” -55	10-00067-01	146	146	182	182	76	13	7,5	2000	11	220	13	3,4
3” -60	10-00065-01	146	146	182	182	76	13	7,5	2500	11	280	13	3,4
3” -65	10-00066-01	146	146	182	182	76	13	7,5	3000	11	340	13	3,4
BR 3.00-45	20-01038-01				100	63	M12		180	3,0	85	9,0	0,35
BR 3.00-55	20-01039-01				100	63	M12		275	3,0	125	9,0	0,35
BR 3.00-60	20-01040-01				100	63	M12		340	3,0	155	9,0	0,35

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

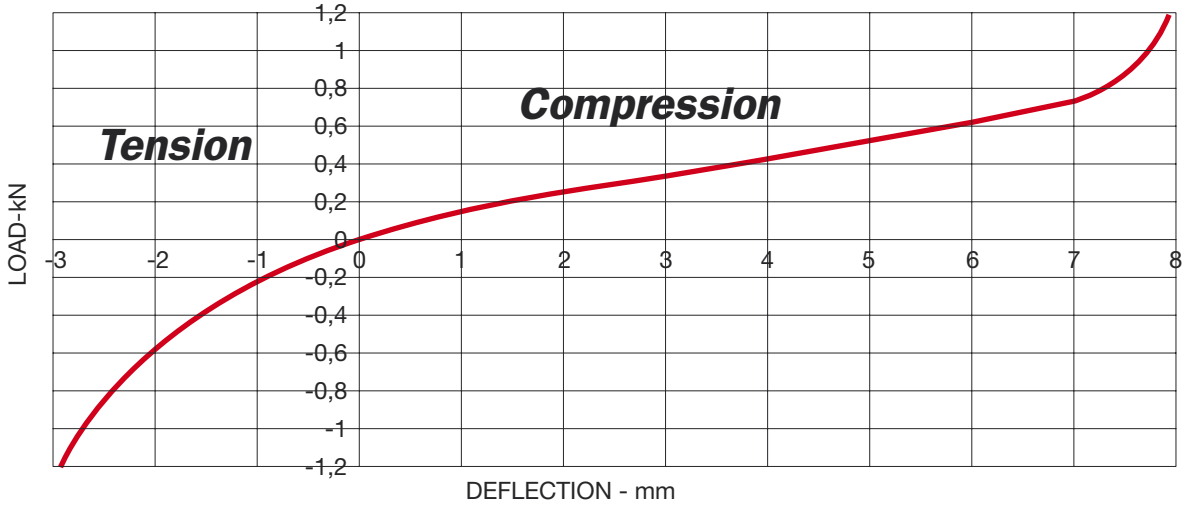
Cushyfloat™ Special

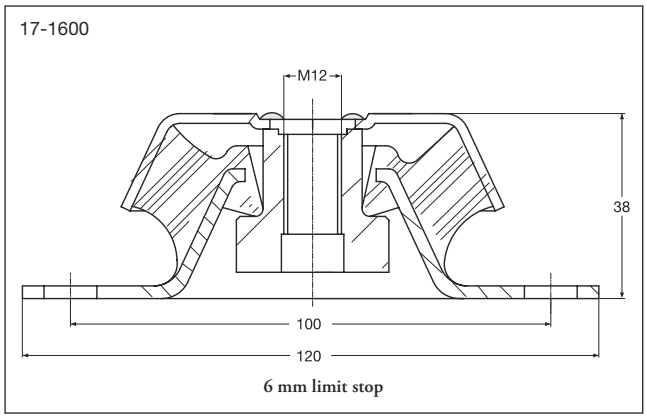
Features

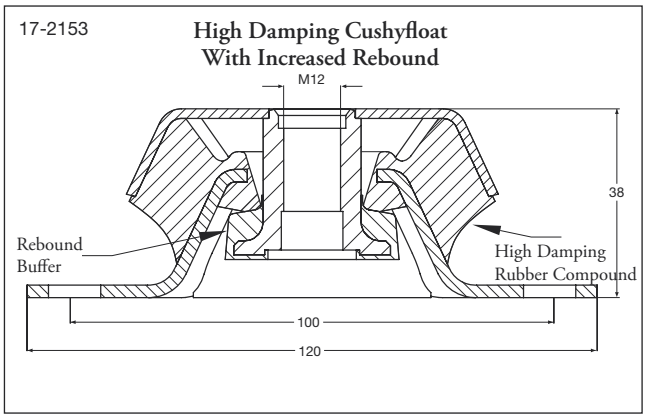
The design incorporates bump and rebound control features, which limit excessive movements under shock loading. Top metal cover gives protection against oil contamination. Protective finish resists corrosion attack.

Metalastik® Cushyfloat™ special is designed for rough off highway environment. Used on engines for small ADT and Excavator etc.

17-2153 Typical Static Vertical Stiffness







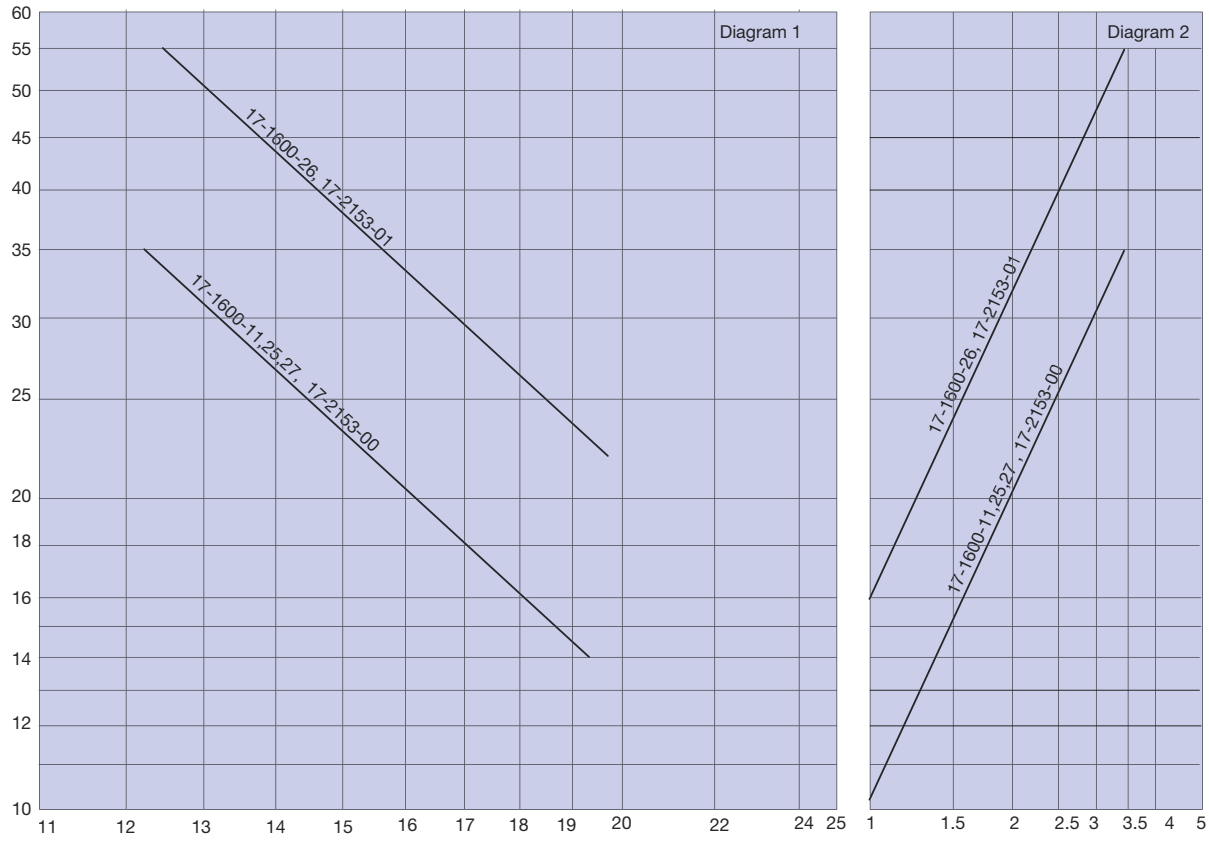
Cushyfloat special

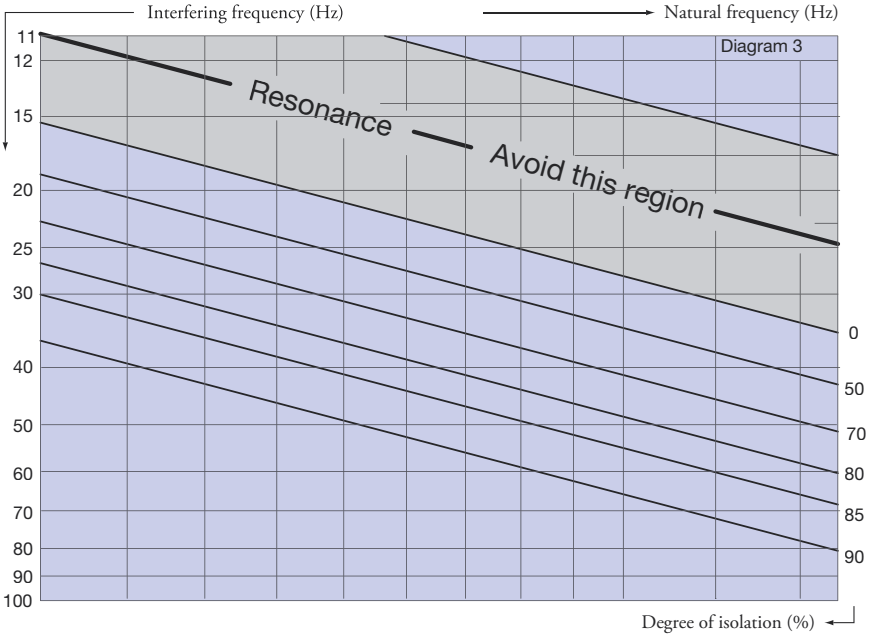
Type	Part no.	Max. Bolt Torque Nm	Max. Load kg	Comments
17-1600-11	10-00738-01	25	35	medium damping
17-1600-25	10-00933-01	25	35	High damping
17-1600-26	10-00934-01	25	55	High damping
17-1600-27	10-02624-01	25	35	High damping - vertical downwards limit stop
17-2153-00	10-00987-01	25	35	High damping - moulded rebound buffer
17-2153-01	10-01045-01	25	55	High damping - moulded rebound buffer

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

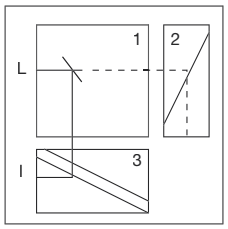
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



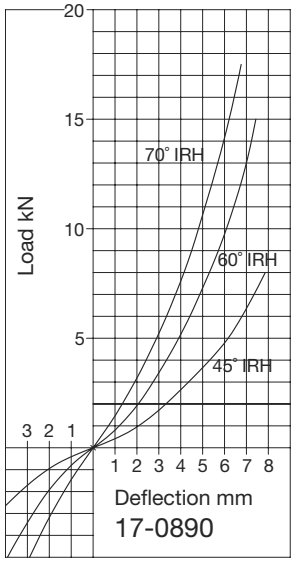


To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically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



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

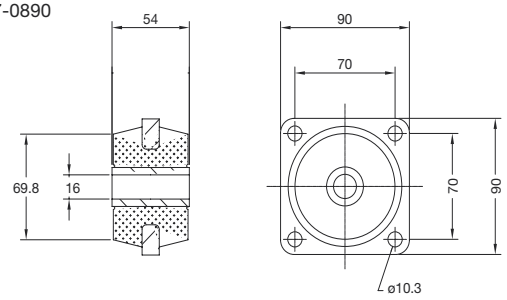
Cab Mounting



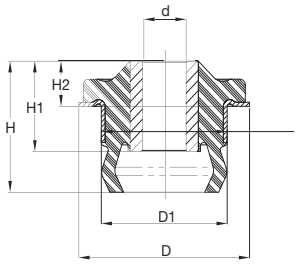
Specially profiled rubber sections together with bump and rebound washers provide optimum cab suspension and vibration isolation characteristics.

Typical applications on off-highway vehicles are cabs but also on engine transmissions.

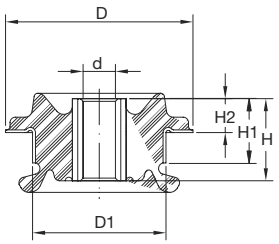
17-0890



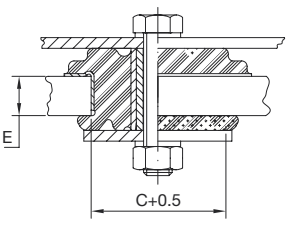
11-1027, 11-1028



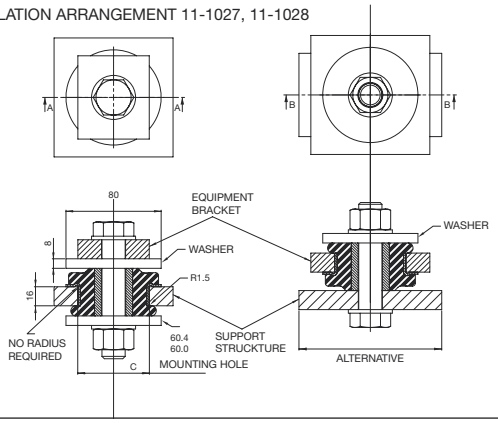
17-1650, 17-1997, 17-1814



Application sample



INSTALLATION ARRANGEMENT 11-1027, 11-1028

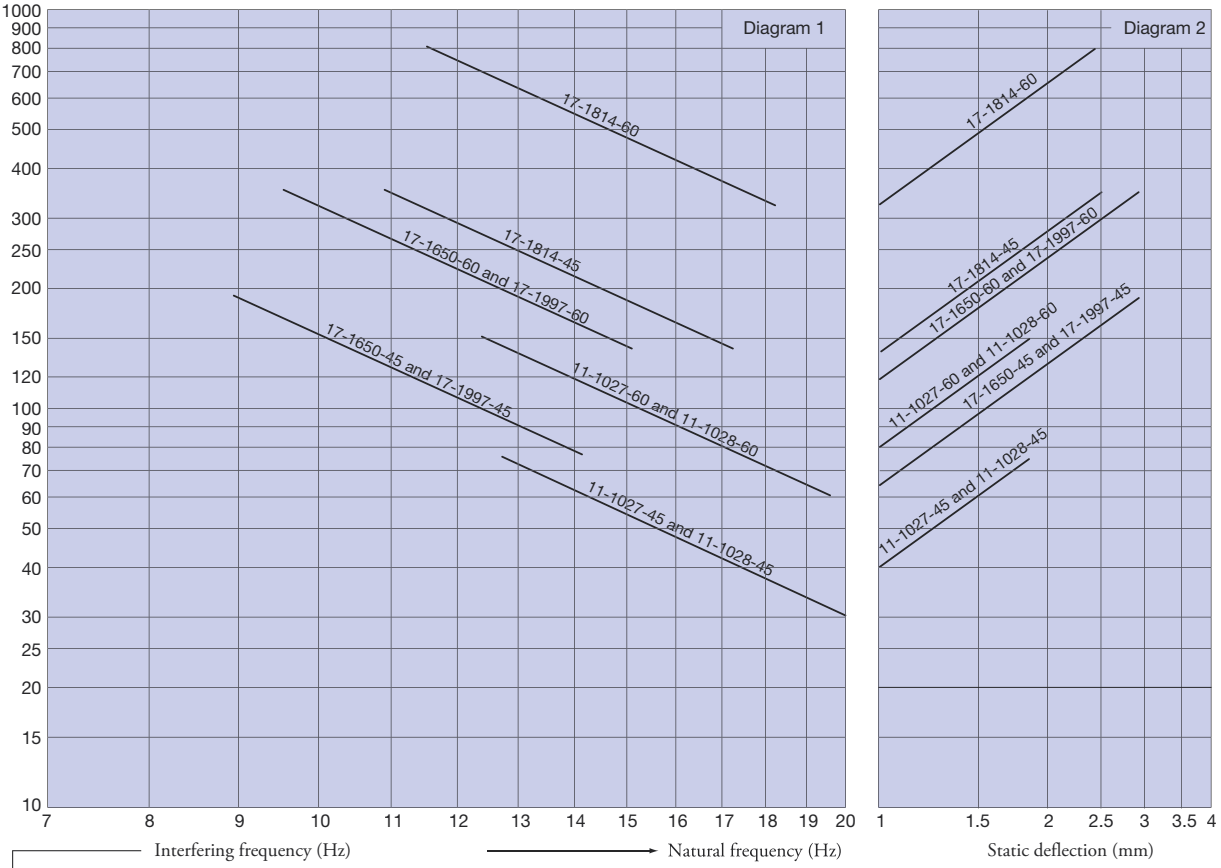


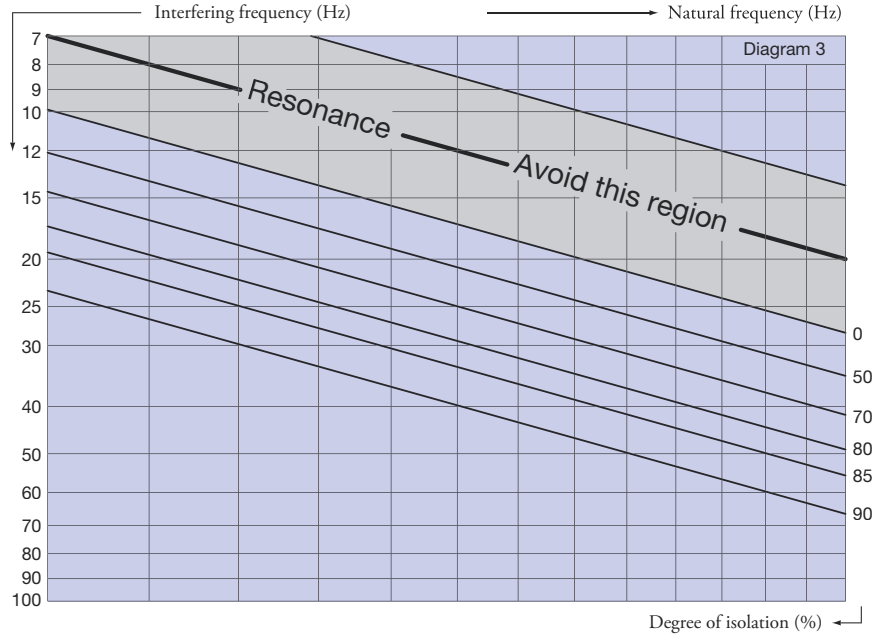
Type	Part no.	Dimension D	D1	d	H	H1	H2	E	C	Bolt Size	Max. Bolt Torque Nm	Max. Load kg	Top & Bottom Washer Part no.
11-1027-45	20-01107-01	80	59	20,3	58	40	20	16	60	M20	380	75	20-00003-01
11-1027-60	20-01108-01	80	59	20,3	58	40	20	16	60	M20	380	150	20-00003-01
11-1028-45	20-00875-01	80	59	16,3	58	40	20	16	60	M16	250	75	20-00532-01
11-1028-60	20-01109-01	80	59	16,3	58	40	20	16	60	M16	250	150	20-00532-01
17-1650-45	10-00552-01	105	75	22	55	46	19	20	75	M20	180	190	20-00533-01
17-1650-60	10-00944-01	105	75	22	55	46	19	20	75	M20	180	350	20-00533-01
17-1997-45	10-00626-01	105	75	16,5	55	46	19	20	75	M16	180	190	20-01494-01
17-1997-60	10-00627-01	105	75	16,5	55	46	19	20	75	M16	180	350	20-01494-01
17-1814-45	10-00598-01	120	89	25	62	47	13	25	89	M24	270	350	20-00534-01
17-1814-60	10-00603-01	120	89	25	62	47	13	25	89	M24	270	800	20-00534-01
17-0890-45	10-00440-01	See Drawing								M16	250	300	20-00532-01
17-0890-60	10-00441-01									M16	250	500	20-00532-01
17-0890-70	10-00442-01									M16	250	750	20-00532-01

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

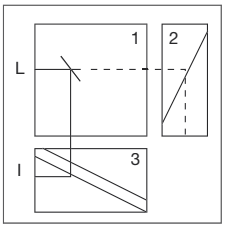
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

2-piece CR mounting

Features

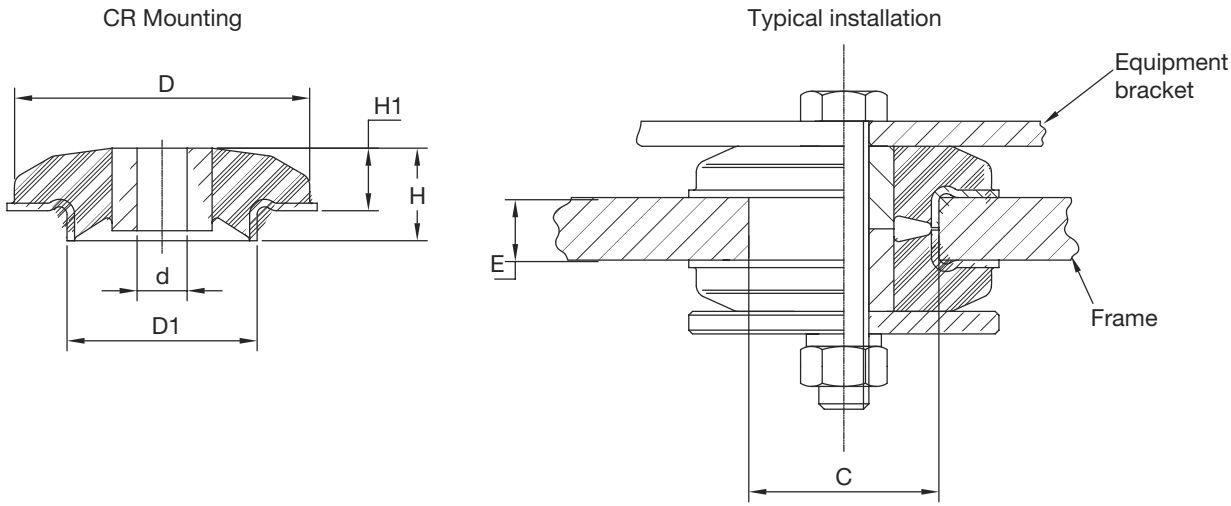
With washer it is a compact fail-safe design easy to fit with a single bolt.

– Integral bonded steel flange prevents rubber wear at interface with bracket.
– No radius or chamfer required for installation hole.
– 2-piece design gives excellent isolation performance and rebound control during shock loading of the vehicle.

CR-Controlled Rebound mounting

A range of mounting designed for high load capacity and low installation height. The high loading for a given size is achieved by utilizing the rubber to best advantage in shear and compression.

– Off-highway engines and Cabs

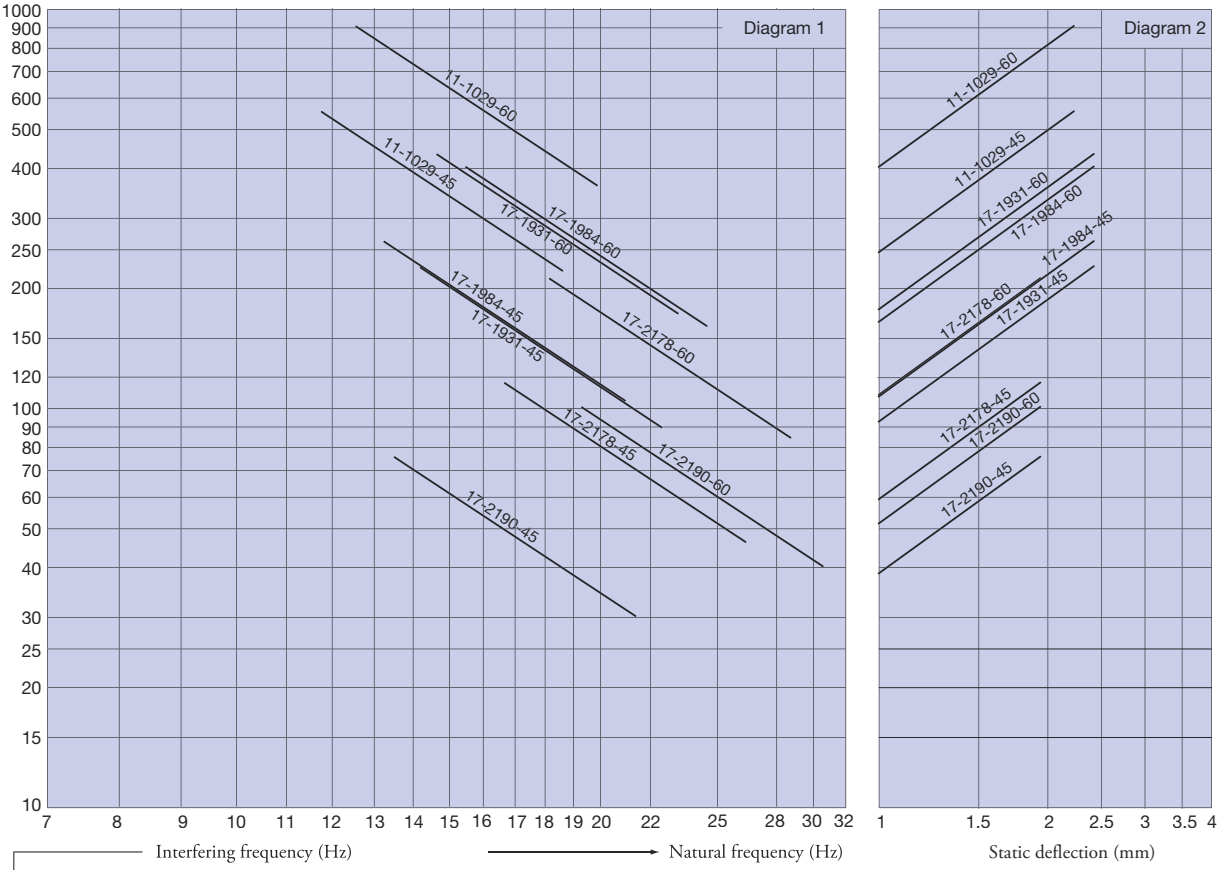


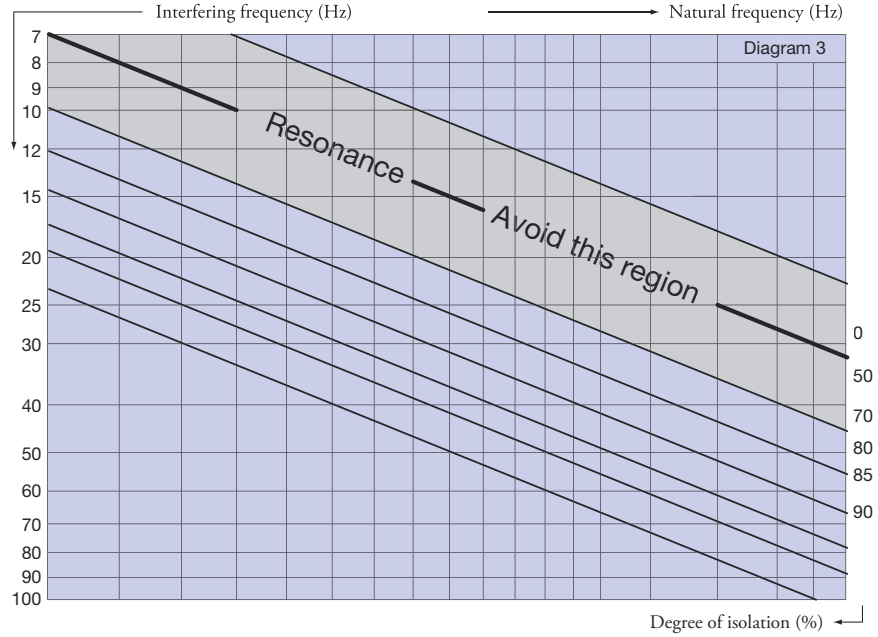
Type	Part no.	Dimension (mm) D	D1	d	H	H1	E	C ±0,2	Bolt Size	Max. Bolt Torque Nm	Max. Load kg	Washer Part no.
17-2190-45	20-01110-01	65	37,8	16	23,3	15,1	12	37,9	M16	170	75	20-01495-01
17-2190-60	20-01111-01	65	37,8	16	23,3	15,1	12	37,9	M16	170	100	20-01495-01
17-2178-45	20-02506-01	94	55,5	16	28	19	20	56,0	M16	250	115	20-01494-01
17-2178-60	10-03729-01	94	55,5	16	28	19	20	56,0	M16	250	210	20-01494-01
17-1984-45	10-03727-01	100	60	22	38	25,8	25	60,5	M22	500	260	20-01493-01
17-1984-60	10-03728-01	100	60	22	38	25,8	25	60,5	M22	500	400	20-01493-01
17-1931-45	10-00622-01	118	75,5	20	38,3	26,4	25	76,0	M20	500	225	20-01493-01
17-1931-60	10-00623-01	118	75,5	20	38,3	26,4	25	76,0	M20	500	430	20-01493-01
11-1029-45	10-03722-01	115	63	27	45	33,5	25	64,0	M24	700	550	20-00534-01
11-1029-60	10-00793-01	115	63	27	45	33,5	25	64,0	M24	700	900	20-00534-01

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

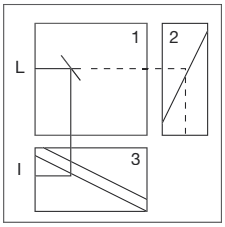
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

EH

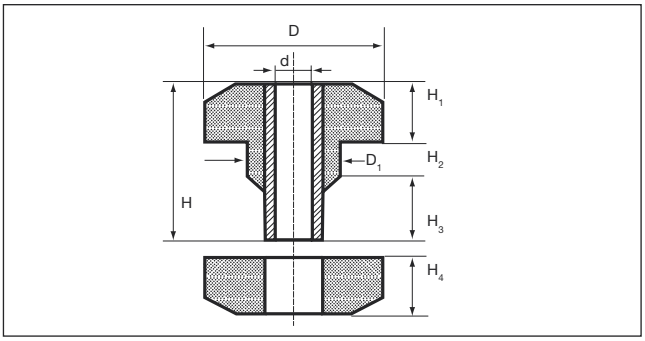
Features

Type EH is designed primarily for mobile applications where high dynamic and shock forces are encountered.
Dynamic vertical movements in both the directions are restricted and excellent horizontal stability is provided.

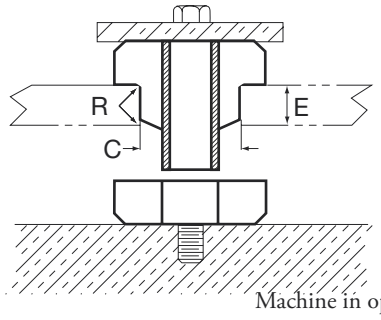
The function of EH includes features as:
- Dynamic efficiency in all directions
- Attenuation of structure-borne noise
- Accommodation of misalignment and distortion
- Simple design-easy to install
- Fail-safe installation
- Wide load range, 60 to 350 kg

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

Typical applications:
- Off-highway vehicles
- Military vehicles
- Construction equipment
- Material handling vehicles
- Agriculture vehicle



Example of installation



Example of installation

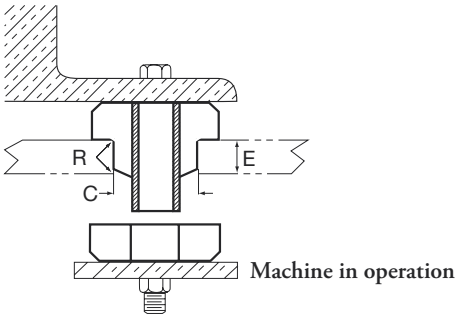


Table of dimensions for installation

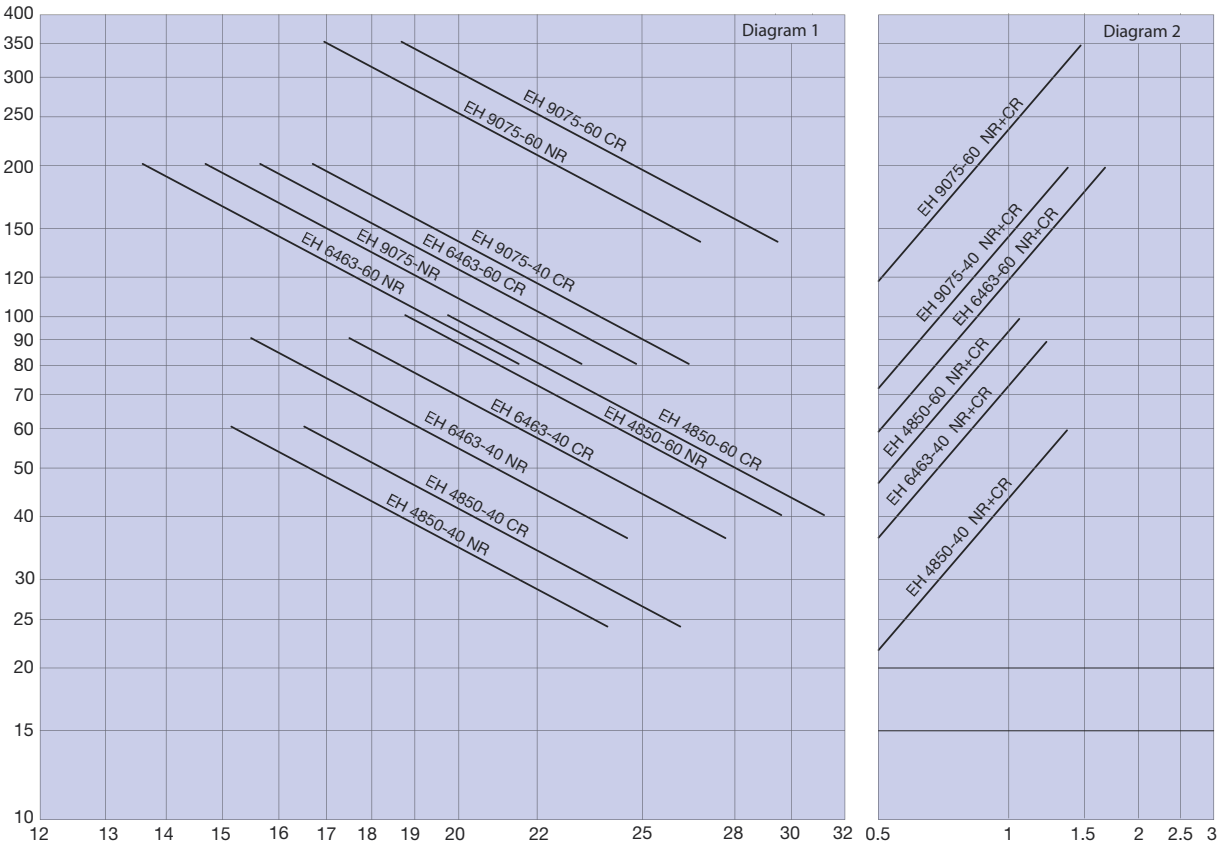
Type	Part no.	Dimension mm d	D	D	H	H1	H2	H3	H4	C	E	R	Bolt Size	Max. Bolt Torque Nm	Max.* Axial Load kg	Top & Bottom Washer Part no.
EH 4850-40 NR	20-00621-01	13	50	32	50	20	10	20	20	31,0	15,0	1,5	M12	40	60	20-00416-01
EH 4850-60 NR	20-00620-01	13	50	32	50	20	10	20	20	31,0	15,0	1,5	M12	40	100	20-00416-01
EH 6463-40 NR	20-00619-01	17	64	40	62	23	14	25	23	39,0	22,0	2,3	M16	80	90	20-01495-01
EH 6463-60 NR	20-00618-01	17	64	40	62	23	14	25	23	39,0	22,0	2,3	M16	80	200	20-01495-01
EH 9075-40 NR	20-00617-01	23	89	58	73	25	19	29	25	56,5	28,0	3,0	M22	200	200	20-00533-01
EH 9075-60 NR	20-00616-01	23	89	58	73	25	19	29	25	56,5	28,0	3,0	M22	200	350	20-00533-01
Chloroprene																
EH 4850-40 CR	20-01504-01	13	50	32	50	20	10	20	20	31,0	15,0	1,5	M12	40	60	20-00416-01
EH4850-60 CR	20-01510-01	13	50	32	50	20	10	20	20	31,0	15,0	1,5	M12	40	100	20-00416-01
EH 6463-40 CR	20-01505-01	17	64	40	62	23	14	25	23	39,0	22,0	2,3	M16	80	90	20-01495-01
EH 6463-60 CR	20-01506-01	17	64	40	62	23	14	25	23	39,0	22,0	2,3	M16	80	200	20-01495-01
EH 9075-40 CR	20-01507-01	23	89	58	73	25	19	29	25	56,5	28,0	3,0	M22	200	200	20-00533-01
EH 9075-60 CR	20-01508-01	23	89	58	73	25	19	29	25	56,5	28,0	3,0	M22	200	350	20-00533-01

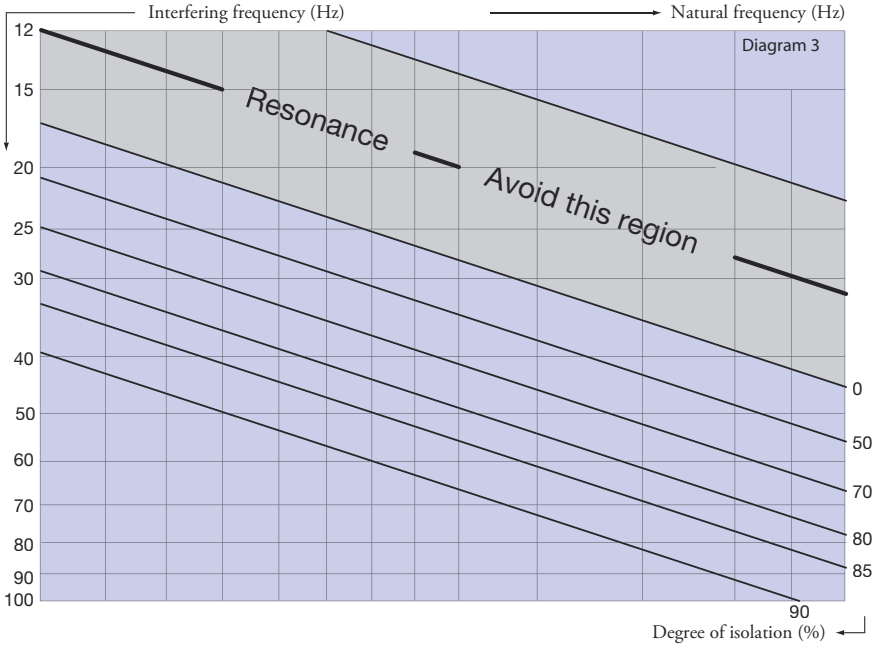
(*) Max. loads have been calculated for extreme off-highway use, these are lower values than shown in the industrial catalogue.

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

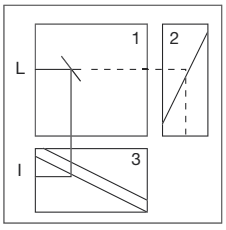
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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



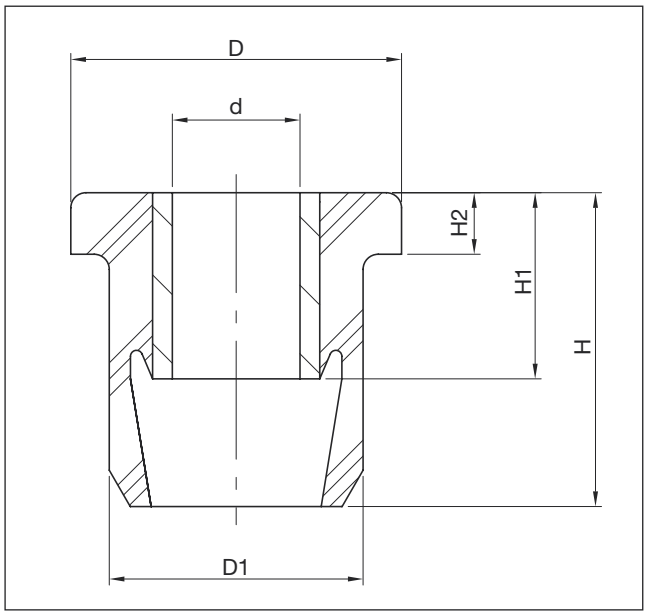
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature.
We will not be held responsible for any danger or damage incurred through improper use or installation.

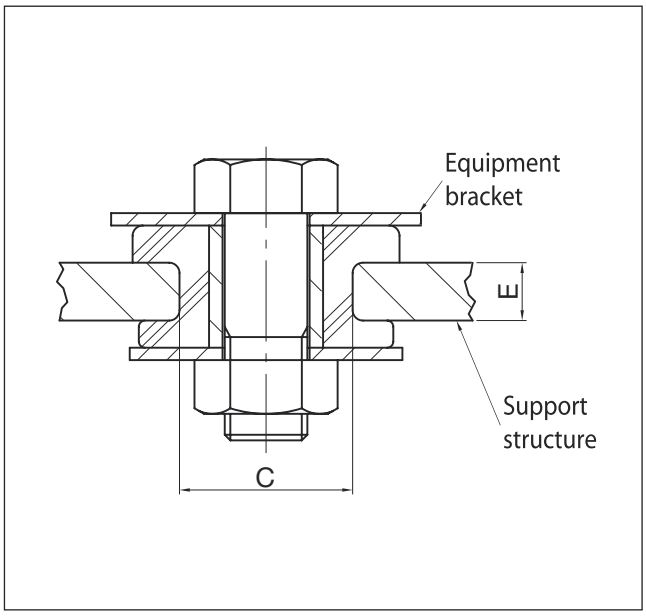
Mushroom MCR

Features

Mushroom Controlled Rebound-MCR mountings are designed for mobile accessories application such as muffler, radiator, pumps etc. where the disturbing frequencies are high.

- Easy to install, single part mount
- Can be used as resilient mount to take up small bracket and chassis misalignments.
- Provides isolation of high frequency vibrations and shock protection of vehicle mounted equipment.



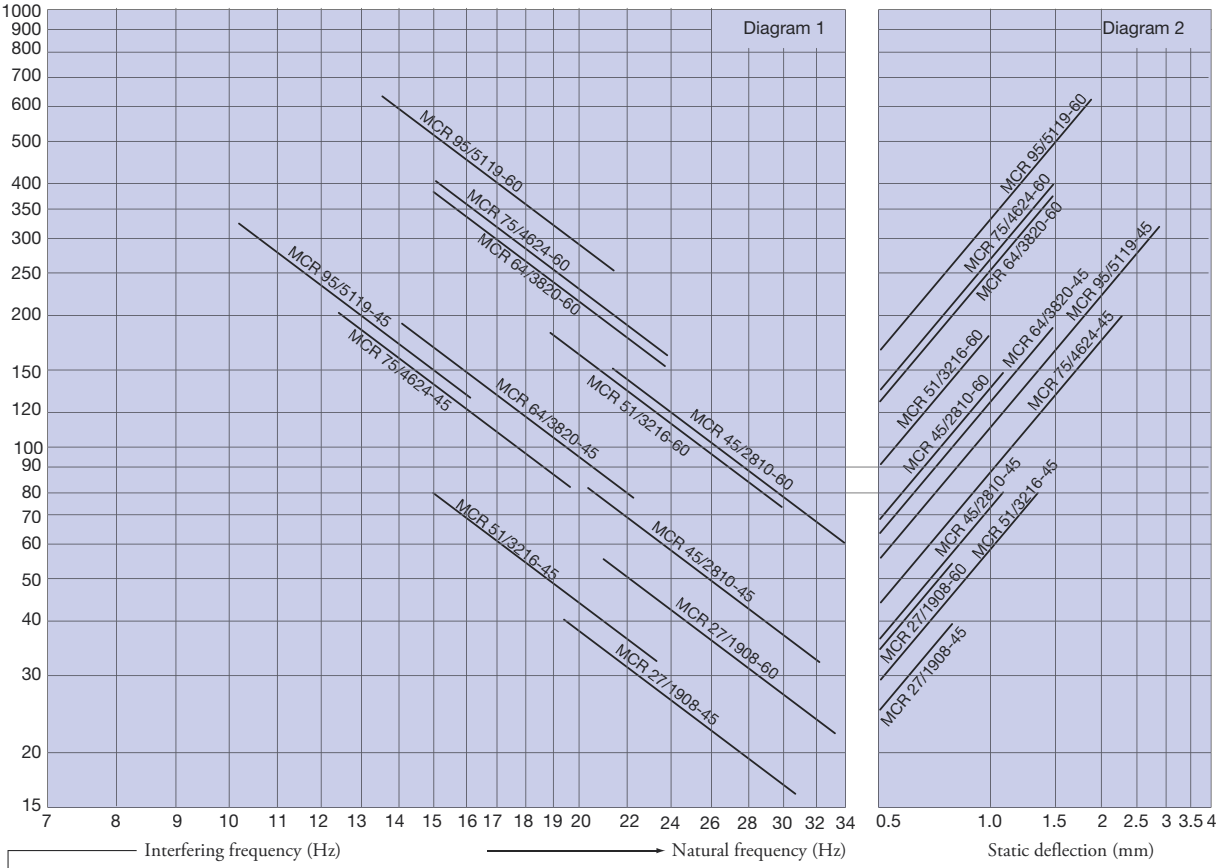


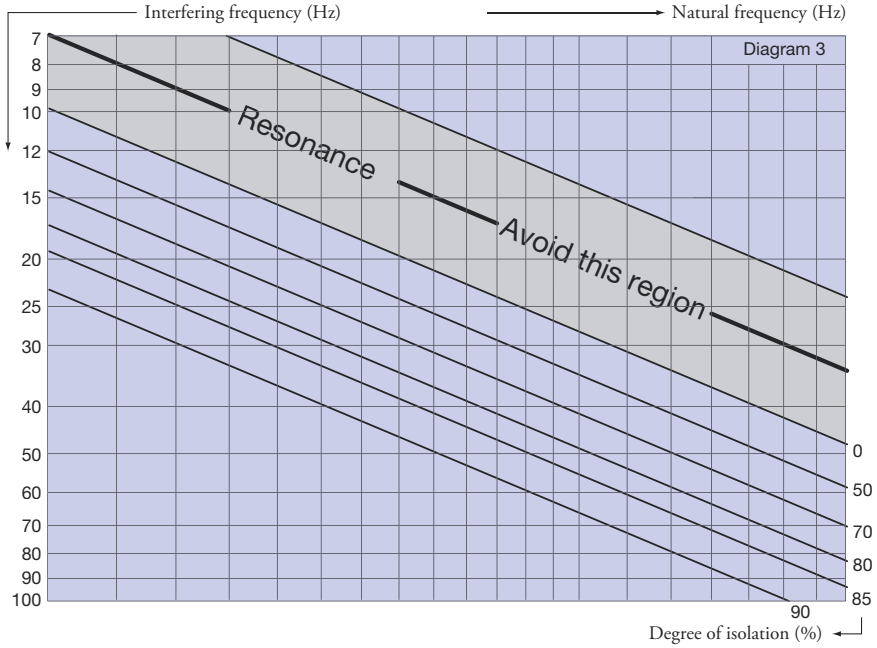
Type	Part no.	Dimension (mm)									Bolt Size	Max. Bolt Torque Nm	Max. Axial Load kg	Top & Bottom Washer Part no.
		D	d	D1	H	H1	H2	E	C±0,2	R				
MCR 27/1908-45	20-01129-01	27,5	10,0	20,0	25,5	15,5	5,0	8,0	19,0	1,5	M10	30	40	20-00531-01
MCR 27/1908-60	20-00831-01	27,5	10,0	20,0	25,5	15,5	5,0	8,0	19,0	1,5	M10	30	55	20-00531-01
MCR 45/2810-45	20-00782-01	45,0	13,0	31,5	32,0	25,0	10,0	10,0	28,5	1,5	M12	50	80	20-00416-01
MCR 45/2810-60	20-01137-01	45,0	13,0	31,5	32,0	25,0	10,0	10,0	28,5	1,5	M12	50	150	20-00416-01
MCR 51/3216-45	20-01133-01	51,8	13,5	34,0	41,0	35,0	13,5	16,0	31,8	1,5	M12	50	80	20-00536-01
MCR 51/3216-60	20-01134-01	51,8	13,5	34,0	41,0	35,0	13,5	16,0	31,8	1,5	M12	50	180	20-00536-01
MCR 64/3820-45	20-00833-01	64,0	16,0	41,0	50,0	43,0	16,0	20,0	38,0	3,0	M16	135	190	20-01495-01
MCR 64/3820-60	20-01130-01	64,0	16,0	41,0	50,0	43,0	16,0	20,0	38,0	3,0	M16	135	380	20-01495-01
MCR 75/4624-45	20-01135-01	75,0	16,0	50,0	56,0	50,0	21,0	23,5	46,0	3,0	M16	135	200	20-00532-01
MCR 75/4624-60	20-01136-01	75,0	16,0	50,0	56,0	50,0	21,0	23,5	46,0	3,0	M16	135	400	20-00532-01
MCR 95/5119-45	20-01131-01	95,0	21,0	57,0	63,0	51,0	25,0	19,1	50,8	3,0	M20	135	320	20-00533-01
MCR 95/5119-60	20-01132-01	95,0	21,0	57,0	63,0	51,0	25,0	19,1	50,8	3,0	M20	135	625	20-00533-01

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

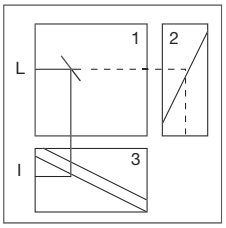
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





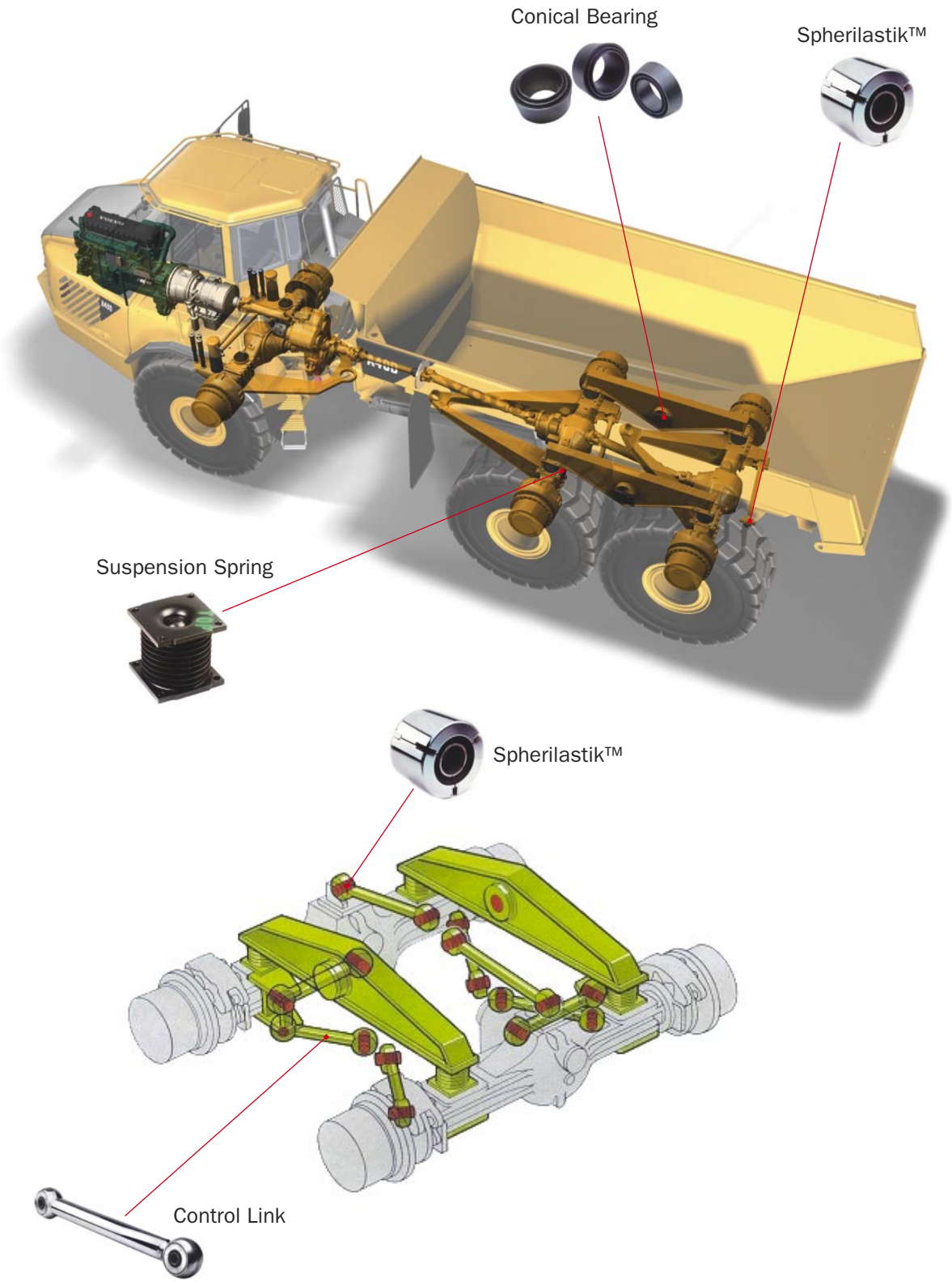
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically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



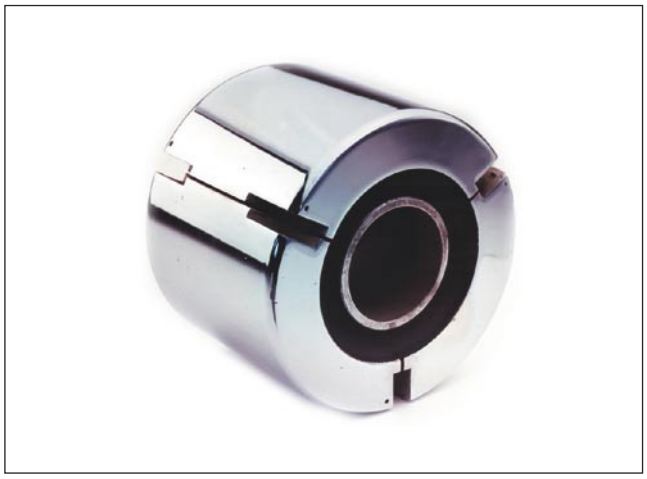
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Suspension range

Suspension Systems



Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

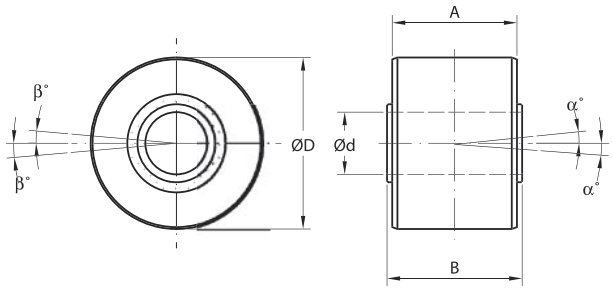


Typical use include traction and braking reaction rods for off-road vehicles, hydraulic damper fixings and other applications where a high duty bearing of compact size is required.

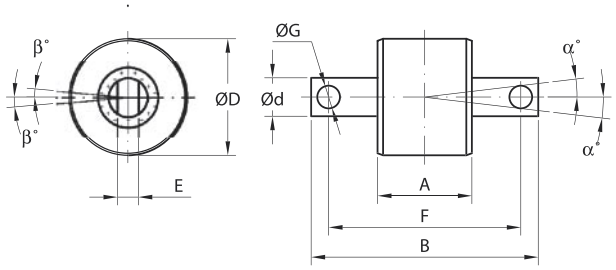
Features/Applications

A heavy-duty flexible bearing which combines high-load carrying capacity with the ability to accommodate torsional and angular movements in all planes without lubrication and metal-to-metal wear.

Spherilastik™ bearings, centre bore type



Spherilastik™ bearings, trunnion type



General guidance notes for selection:

1. Properties quoted for the components in this leaflet relate to continuous steady loading or deformation conditions.
2. For continuous dynamic cyclic loading or deformation, the maximum values should be reduced to approximately 30% of the figures quoted, depending on frequency.
3. For medium and low incidence loading and deformation, the tabled values may be increased up to 2 to 3 times.
4. Combined stressing in the different modes and the effects of stress reversals may require a more critical assessment.

		Dimensions in mm							Radial		Torsion		Conical			
									Stiffness	Max. Load	Stiffness	+/- beta	Stiffness	+/- alpha	Weight	Recommended Housing
Type	Part no.	d	D	A	B	E	F	G	kN/mm	kN	kNn/rad	degrees	kNm/rad	degrees	(kg)	Diameter (mm)
Centre Bore	10-00237-01	28,6	90,5	70,0	76,2				93	58	2,8	8	2,8	6	2,5	90.475 / 90.513
Centre Bore	10-01099-01	44,5	127,0	101,6	104,8				87	93	6,8	7	6,2	7	6,4	126.98 / 127.04
Centre Bore	10-00273-01	50,1	127,0	101,6	104,8				260	220	15	6	13	5	6,3	126.98 / 127.04
Centre Bore	10-03723-01	37,1	150,0	120,0	140,0				150	205	12	8	11	8	8,0	150.02 / 150.07
Centre Bore	10-03078-01	31,3	127,0	101,6	120,0				87	93	6,8	7	6,2	7	6,4	126.98 / 127.04
Trunnion	10-00878-01	48,0	90,6	70,0	170,0	30,0	130,0	20,5	90	58	2,8	8	2,8	6	3,0	90.47 / 90.51
Trunnion	10-00304-01	50,5	104,8	76,2	170,0	30,0	130,0	19,0	220	150	4,5	8	7,5	6	5,8	104.76 / 104.80
Trunnion	10-03615-01	50,5	104,8	76,2	195,0	30,0	152,0	23,2	220	150	4,5	8	7,5	7	6,1	104.76 / 104.80
Trunnion	10-02512-01	50,5	104,8	76,2	170,0	30,0	130,0	20,8	220	150	4,5	8	7,5	7	5,8	104.76 / 104.80
Trunnion	10-02513-01	50,5	104,8	76,2	195,0	30,0	152,0	25,0	220	150	4,5	8	7,5	7	6,1	104.76 / 104.80

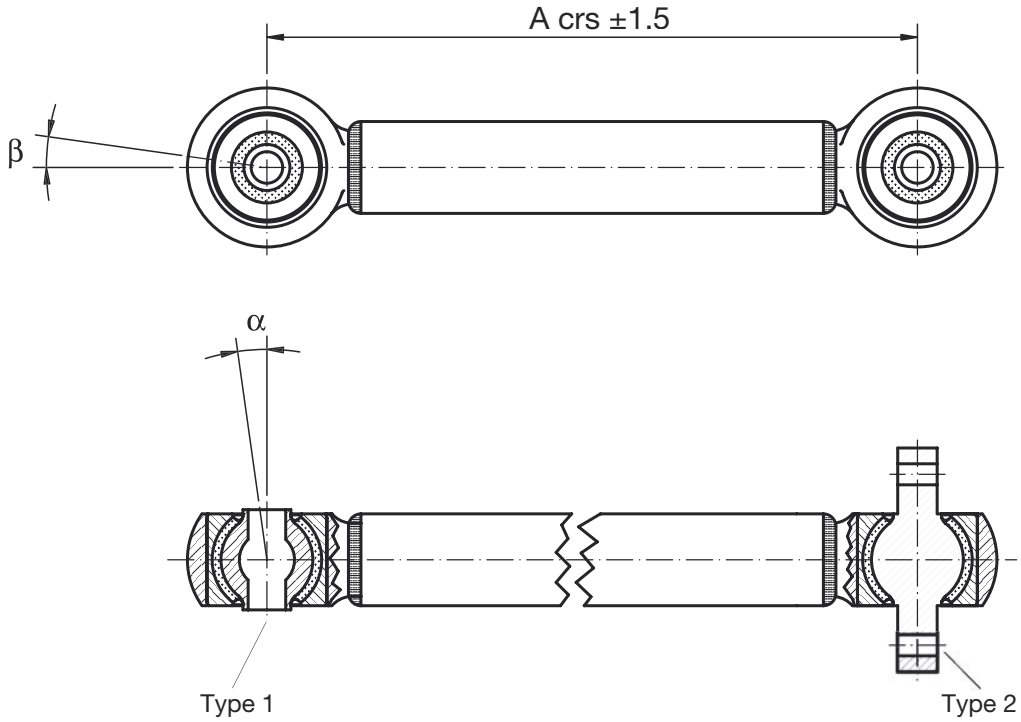
Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Control Links

Features

A range of Control Links incorporating Spherilastik™ Bearings are available and typical sizes are listed below. Further details are available on request.

- Typical applications on off-highway vehicle suspensions, traction and braking reaction rods and panhard rods.
- High load capacity with integral maintenance free Spherilastik™ flexible bush.
- Option for either a through hole or pin type end connection.



General guidance notes for selection:

1. Properties quoted for the components in this leaflet relate to continuous steady loading or deformation conditions.
2. For continuous dynamic cyclic loading or deformation, the maximum values should be reduced to approximately 30% of the figures quoted, depending on frequency.
3. For medium and low incidence loading and deformation, the tabled values may be increased up to 2 to 3 times.
4. Combined stressing in the different modes and the effects of stress reversals may require a more critical assessment.

Part no.	Spheralastik Part no.	Type	A Distance	Max. Load kN	+/- beta degrees	+/- alpha degrees	Weight (kg)
10-03292-01	10-00237-01	1	720,0	58,0	6	8	16,0
10-03283-01	10-00878-01	2	490,0	58,0	6	8	12,0
10-03280-01	10-02512-01	2	530,0	80	7	8,0	28,0

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

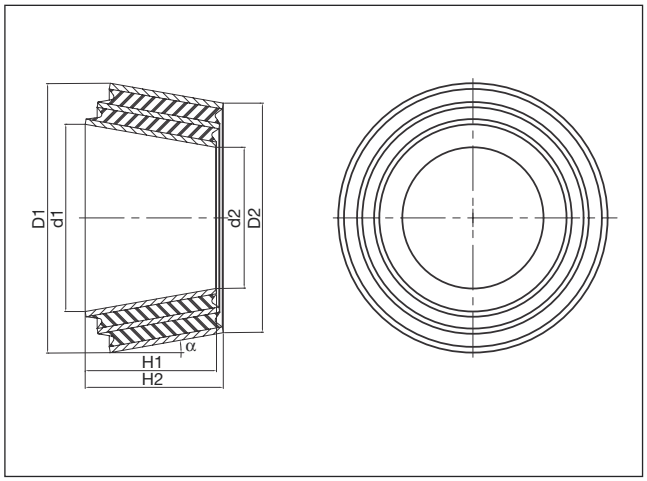
Each bush comprises of a high tolerance conical metals with high quality natural rubber compounds featuring low creep and high tear and tensile properties. This provides for high fatigue resistance at high loads and movements. They provide good shock attenuation whilst providing good control in the radial and axial directions.

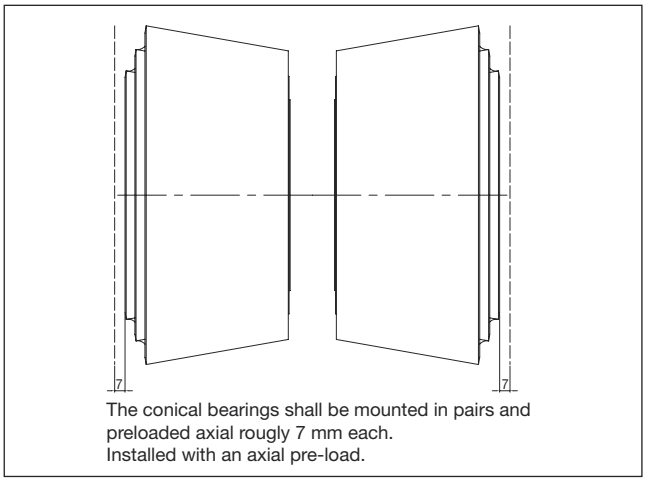
Features

Conical bearings are used usually in pairs to transfer radial & axial loads but allowing large torsional movement and some conical. These are therefore suitable in applications where controlled flexibility is required such as in large travel suspension systems.

The high accuracy components provide

- High fatigue life
- Wide radial load range
- High torsional movement





The conical bearings shall be mounted in pairs and preloaded axial rougly 7 mm each.
Installed with an axial pre-load.

Part no.	Dimension (mm)					
	D1	d1	D2	d2	H2	α
10-01401-01	215,5	149	194,5	120,5	80	9

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

Suspension spring

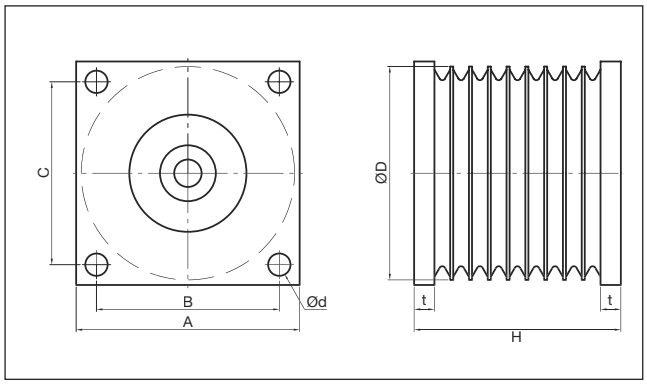
Trelleborg IAVS suspension springs are designed to provide a maintenance free flexible load bearing component allowing angular and shear movement whilst supporting high axial loads.

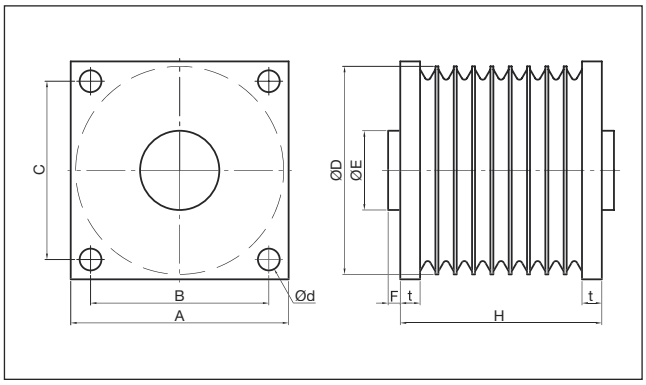
The latest FE analysis technology has been applied to ensure maximum reliability and minimum stress points whilst maintaining an uncomplicated design to minimize manufacturing costs.

Features

Each component is manufactured from high strength steel with high impact and wear characteristics with heavy-duty top and bottom plates to resist negative loading and provide safe anchor points.

There is also a built in fail-safe device to prevent total mount failure in the case of severe overload. These are also manufactured from the highest-grade steel to provide high tensile strength without compromising embrittlement.





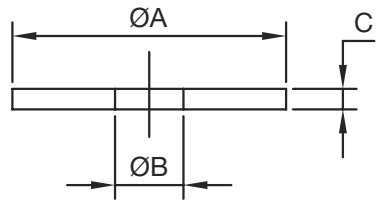
Part no.	Dimension (mm) A	B	C	D	d	E	F	H	t	Fail Safe system	Max. Load kN
10-01640-01	190	150	160	180	17			180	15	Bolt	150
10-01641-01	190	150	160	180	17			182	15	Bolt	150
10-01677-01	220	180	180	210	22			203	20	Bolt	400
10-03501-01	170	140	140	165	14	55	18	150	9,5	Chain	55
10-03132-01	190	150	160	184	16,5			185	10	N/A	70
10-00951-01	190	150	160	184	16,5	80	25	185	10	Chain	70

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

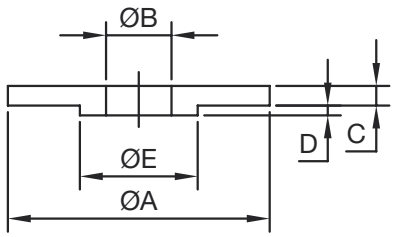
Top and bottom washers

Overload and rebound washers (top and bottom) are necessary to limit maximum movement in the event of shock loading and to provide fail-safe connections for mobile applications.

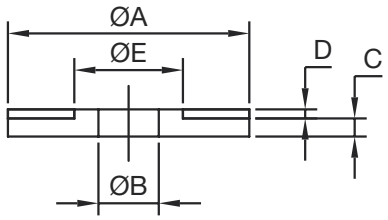
Type A
Steel Washer



Type B
Top Stepped Steel Washer



Type C
Rebound Washer with Rubber



Part no.	Type	Dimension in mm A	B	C	D	E	Top Washer to:	Bottom Washer to:
20-00531-01	A	50	10	4			17-0379, 17-1629, 17-1743 & MCR 27/1908	17-0379 & MCR 27/1908
20-00536-01	A	51	16	4			MCR 51/3216	17-1690, 17-1691 & MCR 51/3216
20-00416-01	A	52	12,5	3			17-1690, 17-1691, HK 60, EH 4850 & MCR 45/2810	EH 4850, HK 60 & MCR 45/2810
20-00644-01	A	55	20	5				HK 600
20-01495-01	A	66	16,2	5			17-2190, MDS 66/4020, EH 6463 & MCR 64/3820	MDS 66/4020, EH 6463 & MCR 64/3820
20-00532-01	A	80	16	5			11-1009, 11-1028, 17-0391, 17-0566, 17-0890, 17-1032, 17-1865, MCR 75/4624 & MDS 80/3820	11-1009, 11-1028, 17-0276, 17-0277, 17-0285, 17-0311, 17-0341, 17-0391, 17-0566, 17-0890, 17-1032, 17-1865, MCR 75/4624 & MDS 80/3820
20-00003-01	A	80	20,5	8			11-1027	11-1027
20-00533-01	A	100	20	6			17-1101, 17-1650, 17-1843, EH 9075 & MCR 95/5119	17-1101,17-1650,17-1843, EH 9075 & MCR 95/5119
20-01494-01	A	100	17	7			17-2178 & 17-1997	17-1997
20-01493-01	A	124	22	9			17-1984 & 17-1931	
20-00534-01	A	139	24	10			11-1029, 17-1550, 17-1814	17-1814 & 15-1550
20-00529-01	B	55	12	4	2	25	17-0189, 17-0241, 17-0248, 17-0472 & 17-0479	
20-00528-01	B	80	20	5	2	35	17-0225 & 17-1227	
20-00773-01	B	80	16	5	2	31	17-0276, 17-0277, 17-0285, 17-0311 & 17-0341	
20-00643-01	B	110	20	5	3	52,5	HK 600	
20-00527-01	B	116	24	8	4	47	17-0146 & 17-0168	
10-03724-01	C	47,5	10	3,2	3,15	24		17-1629 & 17-1743
10-00524-01	C	50	12	4	2	25		17-0189, 17-0241, 17-0248, 17-0472 & 17-0479
20-00036-01	C	75	20	6	3	50		17-0225 & 17-1227
20-00031-01	C	100	25	7	4	47		17-0146 & 17-0168

Trelleborg Industrial AVS operates a policy of continuous improvement and development. We reserve the right to change design and specification of our products without prior notification or alteration of literature. We will not be held responsible for any danger or damage incurred through improper use or installation.

A SAFE CHOICE ALL OVER THE WORLD

Head Office
Trelleborg Industrial AVS
1 Hoods Close, Leicester
LE4 2BN, England
Tel: +44 116 267 0300
Fax: +44 116 267 0301
industrialavs.uk@trelleborg.com

Branches
Trelleborg Industrial AVS Belux
(p/a) Trelleborg Wheel Systems Belgium NV
Brugsesteenweg 7
BE-9940 Evergem, Belgium
Tel: +32 9 258 10 94
Fax: +32 9 253 61 80
industrialavs.belgium@trelleborg.com

Trelleborg Industrial AVS Netherlands BV
Zeemanstraat 71-73
NL-2991 XR Barendrecht, Holland
Tel: +31 10 292 7414
Fax: +31 10 479 7079
industrialavs.holland@trelleborg.com

Trelleborg Industrial AVS France SAS
Mini Parc du Verger, Bâtiment G
1, rue de Terre Neuve
FR-91940 Les Ulis, France
Tel: +33 1 64 86 42 60
Fax: + 33 1 64 86 42 69
industrialavs.france@trelleborg.com

Trelleborg Industrial AVS Sweden
P O Box 9020
SE-15 109 Södertälje Sweden
Tel: +46 8 550 34 490
Fax: +46 8 550 34 494
industrialavs.sweden@trelleborg.com

Trelleborg Industrial AVS Sweden
SE-231 81 Trelleborg, Sweden
Tel: +46 410 510 00
Fax: +46 410 193 70
industrialavs.sweden@trelleborg.com

Trelleborg Industrial AVS Germany GmbH
Dudenstrasse 27 - 35
DE-68167 Mannheim, Germany
Tel: +49 621 484 650
Fax: +49 621 484 6565
industrialavs.germany@trelleborg.com

Trelleborg Industrial AVS USA, Inc.
1431 East Algonquin Road,
Arlington Heights, Illinois 60005 USA
Tel: +1 847-357 1600
Fax: +1 847-357 1701
industrialavs.usa@trelleborg.com

Trelleborg Industrial AVS Italy
c/o Trelleborg Wheel Systems Spa
Via V. De Vizzi, 60
I-20092 Cinisello Balsamo (MI), Italy
Tel: +39 02 660 393 80
Fax: +39 02 660 393 81
industrialavs.italy@trelleborg.com

www.trellextreme.com

TRELLEBORG