

Trelleborg IAVS product catalogue

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Trelleborg industrial anti-vibration solutions

With over 100 years of experience as Metalastik and Novibra, today Trelleborg Industrial AVS make improvements people can physically feel. From smoother travel to quieter, more efficient machines, we make life feel better. With quality, testing and compliance built in, we're in it for the long haul, ensuring your solution works over an extended and often arduous life-cycle.

With three state-of-the-art manufacturing plants across the globe, our experience in rubber-to-metal bonding enhances a wide range of industries, including off-highway vehicles, rail and mass transit, marine and energy and industrial applications.

Alongside our large network of trusted distributors, we offer an end-to-end service, to take you from concept through design, manufacturing and testing to delivery. This reduces the complexity of supply, helping you cut costs, mitigate risk and receive on time, on budget delivery, wherever you are.



MAKING THE WORLD FEEL BETTER

Trelleborg Industrial AVS is part of Trelleborg Group, which employs 15,000 people in over 40 countries. Whatever your challenge, whatever your role and wherever you are, Trelleborg is nearby to offer expert knowledge and quality solutions. Work with Trelleborg Industrial AVS and enjoy improvements you can feel.



The Trelleborg difference

PERFORMANCE THAT'S NEVER FELT BETTER

We know that you're looking for more than just products. You're looking for business solutions. That's why our innovation is built around the outcomes you want to achieve. Whether it's providing a safer environment for machine operators, reducing noise pollution, reducing downtime or saving costs and increasing revenue, we can work with you to help you attain your goals.

Building on our long history and track record, we're always evolving our solutions to pre-empt and meet the needs of our customers.

Our expert polymer technologies create maximum business value through improved longevity, productivity and cost effectiveness, optimizing comfort, health and safety, to ensure operators and machines have never felt better.

QUALITY, RELIABILITY, SAFETY

Focused on advanced technology and design, Trelleborg provides the know-how, skill and technical expertise to develop solutions that ensure your organization has never felt better. We believe in intelligent innovation. Our solutions are based on the unique needs of your project and developed in the most cost effective way. So you can feel confident our products give you an advantage that goes beyond the quality of our products.

Because we keep performance up and maintenance down, you can just keep running. All our solutions undergo stringent in-house testing before they are released to market, so you can be confident they'll perform to your high expectations, protecting your productivity and your people.



PARTNERSHIP ETHOS

We believe that working in partnership will achieve the best results for our customers. Our specialist teams will assist you from specification and design to post-installation. We also deliver training for customers on getting the best out of our anti-vibration systems.

LOCAL PRESENCE, GLOBAL REACH

Trelleborg Industrial Anti Vibration Solutions is part of Trelleborg Group, which employs 15,000 people in over 40 countries. Whatever your challenge, whatever your role and wherever you are, we are nearby to offer expert knowledge and quality solutions.

TECHNICAL EXPERTISE

Trelleborg Industrial AVS is a world leader in the design and manufacture of rubber to metal bonded components for noise and vibration isolation in engine mounting and suspension systems. Our skilled R&D team is constantly working to evolve our solutions, working closely with customers to pre-empt and meet changing markets and requirements. As part of our continuous improvement, we proactively work to improve the durability, service life and design of our products.

Customized solutions

Across all application areas our specialist teams will assist you with specification and design. As well as our range of standard products, we offer bespoke solutions that are completely tailored to the needs of your application and project.

Our wide ranging experience allows us to measure and test your environment and model the perfect anti-vibration and suspension system characteristics to meet your needs.



HIGH LEVELS OF SERVICE

Our wide portfolio allows you to reduce the number of suppliers you have to manage, and the complexities of associated administration. You'll even have access to your own dedicated customer service team, to add an extra layer of support.

We'll take your project from concept to delivery, through design, manufacturing and testing, reducing complexity in the supply chain, helping to mitigate risk and facilitating easy administration. Once you're with us, our low maintenance solutions, reliable stock levels and open, transparent communications mean you can manage cost effectively over the long term.

Our global knowledge of regulations and extensive product certification will ensure your solution is totally compliant. What's more, because we realize minimum order values and quantities can be restrictive, we always deliver the amount you require, when you need it. Our strong, global supply chain will both support and enhance your logistics.

This flexibility in logistics also extends to our paperwork and packaging, and our entire offering is supported by convenient communication, tailored to the way you talk. Our high quality products are subjected to stringent testing, by the most rigorous in-house material and product procedures.

A photograph of a male scientist with grey hair and glasses, wearing a white lab coat over a blue shirt. He is focused on his work, holding a small object in his hands. The background is a blurred laboratory setting with various pieces of equipment and glassware. The text 'Quality and innovation' is overlaid in a large, white, sans-serif font.

Quality and innovation

Our product range has been built on application expertise spanning over 100 years, through innovation that solves business issues and supports business growth. Our broad portfolio of high quality, cost efficient industrial products reduce noise and vibration in the most demanding environments, helping to ensure our customers' machinery has never felt better, even after years of hassle-free service.



Working in industry never felt better

INDUSTRIAL APPLICATIONS

We provide performance you can rely on to fit and forget.

Our anti-vibration solutions give you a firm foundation to build sustainable productivity plans upon, across all manufacturing and processing equipment installations. Our strong supply chain means we can reduce costs and deliver on time and on budget.

Our intelligent innovation is focused on the outcomes you want to achieve: providing a safe environment for machine operators, reducing noise pollution, reducing downtime to save costs and increase revenue. We partner with you to provide so much more than products.



Solutions for your market - Industrial

APPLICATION	TYPE OF MOUNT					
Stationary Installations Combustion Engines Compressors, Generators	RA/RAEM	M	RA/RAB	FAIL-SAFE	VEE MOUNTING	CUSHYFOOT
Mobile Installations Vehicle Engines, Compressors, Generators, Marine Engines	CUSHYFLOAT	METACONE	VEE MOUNT			
Sensitive Equipment Electronics, Cameras, Fans, Small Pumps	M	SE	EQUI-FREQUENCY	2 BOLT INSTRUMENTS	FLANGED INSTRUMENT MOUNTING	LOW FREQUENCY
Transit Protection Computers, Test Equipment	VT	M	BA	DOUBLE U-SHEAR		
Vehicles Engines, Cabs, ROPS Cage	METACONE	CAB MOUNTS	EH	UH		
Instrument Mounts Electronic Racks, Radio TX/RX, Mobile Computer Systems	M	2 BOLT INSTRUMENTS	FLANGED INSTRUMENTS	LOW FREQUENCY		
Heavy Duty Isolators Off Highway Vehicles, Vibratory Screens, Large Engines, Public Service Vehicles	SAW	RECTANGULAR SAW	CIRCULAR SAW	COMP SHEAR		
Building & Construction Inertia Blocks, Heavy Plant, Ductwork, Suspended Ceilings	GK	VT	AV-PLATE			
Machine Tools Lathes, Punch Presses, Grinders, Woodworking Equipment	TF	AV-PLATE				
Motion Control Re-Bound, Motion Limitation	SE	BUFFERS	ANB			
Vehicle Suspension Pivot Arms, Trunnion Mounts, Gearbox Mountings	VP/UD	SP BEARINGS	METAXENTRIC BUSHES			
General Purpose Mounts Exhaust Systems, Small Fans, Instrument Panels	TYPE A	TYPE B	TYPE C	TYPE D	TYPE E	



MARINE AND ENERGY

In the marine and energy sectors, downtime is at an absolute premium, so you need solutions and services that just work. Our bespoke anti-vibration and noise suspension solutions for marine applications and energy production are guaranteed to meet specification, regulations and certification requirements, with on time and on budget delivery, to help you navigate complicated logistics and avoid unnecessary downtime.

Harsh and variable conditions demand high quality, low maintenance products and stringent testing. Our solutions encompass these factors and more, enabling you to keep costs low over the whole product and project lifecycle.



Solutions for your market - Marine

APPLICATION	TYPE OF MOUNT						
Naval Noise & Vibration Control Propulsion Engines, Gensets, Machinery Rafts, Electric Converters, Pumps	D-SERIES	DX MOUNT	EQUI-FREQUENCY LARGE	EQUI-FREQUENCY SMALL	SUPER D	SANDWICH MOUNT	
Naval Shock Protection Propulsion Engines, Gensets, Machinery Rafts, Electric Converters, Pumps, Cabinets, Instruments.	DX MOUNT	EQUI-FREQUENCY LARGE	SUPER D	BA AND DOUBLE U-SHEAR	METACONE SHOCK MOUNT		
Motion Control Naval and Commercial Applications	BUFFER	BA AND DOUBLE U-SHEAR					
Commercial Noise & Vibration Control Propulsion Engines, Gensets, Machinery Rafts, Electric Converters, Pumps	CUSHYFLOAT	CUSHYFLOAT HT	CUSHYFLOAT HD	MINI CUSHYFLOAT HD	CUSHYMOUNT	D-SERIES	EQUI-FREQUENCY MOUNTS
Lightweight Shock Protection Sensitive Instruments, Radar & Communications, Electrical Cabinets	BA AND DOUBLE U-SHEAR		M-MOUNT				
High Noise Attenuation Marine Engines, Gensets	SANDWICH MOUNT		SUPER D				
Leisure Boat Noise & Vibration Control Propulsion Engines, Gensets, Pumps	CUSHYFLOAT	CUSHYFLOAT HT	CUSHYFLOAT HD	MINI CUSHYFLOAT HD	RA MOUNT	RAEM	METACONE
Miscellaneous Applications Including Entertainment	M-MOUNT	RA MOUNT	CYLINDRICAL MOUNT				

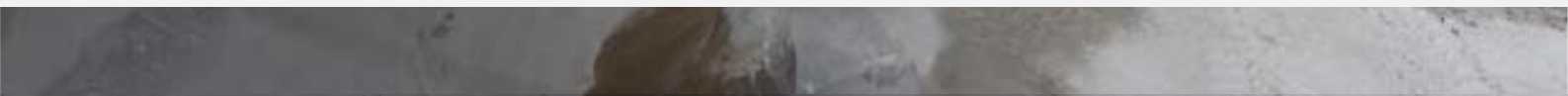


A day's heavy lifting
never felt better

OFF-HIGHWAY VEHICLES

Engines are becoming lower weight, cabs have stricter noise, vibration and harshness levels to adhere to, maintenance access is becoming more difficult, loads are increasing and trucks are becoming heavier: vehicle suspension needs to evolve too.

The demands on off-highway vehicles are more diverse and challenging than ever. That's why our solutions are built to improve safety and comfort, prolong life and optimize performance, allowing you to maximize productivity, reduce downtime and meet environmental objectives.



Solutions for your market - Off-Highway Vehicles

APPLICATION	TYPE OF MOUNT					
Loaders Medium Loaders, Skid Steer Loaders, Compact Track Loader, Backhoe Loader	FLUID MOUNT 	METACONES 	EH 	CUSHYFLOAT 	METAXENTRIC BUSHINGS 	
Excavators Hydraulic Excavator (HEX), Wheeled Excavator (WHEX), Mini Excavator (MHEX)	METACONE 	CUSHYFLOAT 	FLUID MOUNT 	MDS 	RA MOUNT 	EH 
Vibratory Compactors Single Drum Compactor (SD) Asphalt and Soil, Dual Drum Compactor (DD) Asphalt, Vibratory Drum	METACONE 	CUSHYFLOAT 	MDS 	FLUID MOUNT 	EH 	SHEAR MOUNT 
Articulated Dump Trucks 25 - 50 Ton ADT	METACONE 	AXLE TOWER SPRING 	FLUID MOUNT 	SPHERILASTIK BEARING 	CONICAL BEARING 	CONTROL LINKS 
Track Type Tractors Large Track Type Tractor, Track Type Tractor, Small Track Type Tractor	MDS 	METACONE 	EH 	FLUID MOUNT 	METAXENTRIC BUSHING 	SPHERILASTIK BEARING 
Mobile Cranes Wheeled Cranes, Tracked Cranes	MDS 	METACONE 	FLUID MOUNT 	SPHERILASTIK BEARING 	EH MOUNT 	
Lift Trucks/ Fork Lifts Container Lifts, LPG or Diesel Forklifts, Electric Forklifts	MDS 	EH 	METACONE 	CUSHYFLOAT 	FLUID MOUNT 	TCM 
Container Transport Spotter Truck, Automated Guided Vehicles (AGV)	MDS 	EH 	METACONE 	CUSHYFLOAT 		
Agricultural Vehicles Wheeled Tractors, Tracked Tractors, Combine Harvesters, Sprayers, Hay and Forge Harvester	MDS 	EH 	METACONE 	FLUID MOUNT 	CONTROL LINK 	
Forestry Equipment Skidder, Forwarder, Wheeled and Tracked Harvesters	MDS 	EH 	METACONE 	FLUID MOUNT 	TCM 	METAXENTRIC BUSHING 



Being on track
never felt better







RAIL AND MASS TRANSIT

Our materials and technologies are developed to facilitate faster, smoother, quieter and safer rail travel. With safety and reliability so high on the agenda, your market is a rightly conservative one. That's why our solutions come with the reassurance of extensive and reliable testing, and finite element analysis carried out in our IRIS approved factory.

The industry is globalizing rapidly, but political and economic factors still demand localization. With over 100 years' experience supplying anti-vibration solutions to the global rail industry, we have a deep knowledge of national and international regulations and can help you to ensure compliance through high quality, total reliability solutions.



Solutions for your market - Rail

APPLICATION	TYPE OF MOUNT					
Primary Suspension	CHEVRON SPRING	METACONE PRIMARY SPRING	RADIAL ARM BEARING*	TRACTION LINK*		
						
Secondary Suspension	AIRSPRING*	BEARER SPRING	HOURGLASS SPRING			
						
Anti-Roll Bar Systems	SPHERILASTIK BEARINGS	HALF SHELL BEARING*				
						
Control and Traction Centers	UD BUSH	BEARER SPRING	BUFFER*	LOW FRICTION BUFFER*		
						
Power Train System	METACONE	VEE MOUNT	SPHERILASTIK BEARING	UD BUSH	MDS	CUSHYMOUNT
						
Ancillary Equipment Control	See industrial product range.					

* Contact Trelleborg IAVS or your local distribution partner for further information on these products

Product List

ANTI-VIBRATION PRODUCTS		
ANB	Buffers are designed to protect structures and equipment from impact forces. They are usually fitted as non-metallic stops or incorporated in vehicle suspension systems to provide progressive stiffening under increasing load.	30
Axle Tower Spring	Trelleborg IAVS axle suspension tower springs are designed to provide maintenance free flexible load bearing capabilities by allowing angular and shear movement whilst supporting high axial loads.	31
BA & Double U-Shear	Novibra® type BA and Metalastik® type Double U-Shear are equally suitable for isolating vibrations from low speed machines and equipment while also protecting sensitive and lightweight units from external shocks and vibrations.	32
Bearer Spring	Suitable for mass transit applications, bearer springs are designed to support the vehicle body in their compression mode whilst allowing horizontal, lateral and rotational bogie movements by virtue of the more flexible shear mode.	33 - 34
Bobbins	A supplementary range of cylindrical mountings for a wide range of applications. They can be loaded either in compression or shear taking into consideration individual demands for actual applications.	35 - 39
Buffers	Buffers are designed to protect structures and equipment from impact forces. They are usually fitted as non-metallic stops or incorporated in vehicle suspension systems to provide progressive stiffening under increasing load.	40
Cab Mounts	Specially profiled rubber section together with bump and rebound control washers provide optimum suspension characteristics for cabs on commercial vehicles, tractors, earthmoving equipment and construction plant.	41
Chevron Spring	Chevron Springs provide three modes of flexibility for axelbox primary suspensions. Suspension properties are achieved by fitting the springs in a 'vee' configuration enabling shear and compression compliance within the rubber elements.	42 - 45
Circular Saw Mount	Used in a variety of industrial applications including vibratory rollers and small screens.	46
Conical Bearing	Due to their unique nature, the conical bearing is suitable in applications such as large travel suspension systems, where controlled flexibility is required.	47
Cushyfloat®	The Cushyfloat mounting is a general purpose unit designed to provide effective isolation of vibration and noise arising from both static and mobile equipment. Also marine engine suspension.	48
Cushyfloat® HT	The HT Cushyfloat (High Thrust) Mounting has been developed to meet the increased torque output and higher thrust load requirements of many modern marine power units.	49
Cushyfloat® HD	The latest generation of Metalastik Cushyfloat® is a completely new and innovative design which offers engine manufacturers and boat builders maximum versatility.	50
Cushyfloat® Mini HD	The Mini HD Cushyfloat combine 3 way control of suspended equipment with large static deflections where the rubber is loaded in shear and compression. The design incorporates bump and rebound control features which limit excessive movement under shock loading.	51
Cushyfoot®	Cushyfoot mountings are suitable for many different types of machinery, such as stationary diesel engines, generator sets, fans, hydraulic units and lift machinery.	52
Cushymount®	The Cushymount benefits from large deflections, high load capacity and long service life. The product incorporates an integral adjustable buffer to limit horizontal and vertical movements of suspended equipment under shock loading	53

Product List

ANTI-VIBRATION PRODUCTS		
D-Series	The significant rubber volume of the D-series mount ensures a high degree of insulation against low frequency vibrations. Differing stiffness rates in the two horizontal modes enables suspension characteristics to be optimized by appropriate orientation of the mountings.	54
DX	The DX mount has been developed to complement the D-series and super D product ranges in order to extend shock deflection capability up to 100 mm in the vertical direction.	55
EH	Type EH mountings are designed to achieve effective vibration isolation on engines, operator cabs and other ancillary units.	56
Equi-Frequency Mountings	General purpose low profile mounting for use where space is restricted. Suitable for stationary applications. May also be used to protect delicate or sensitive units from external shock or disturbances.	57 - 58
Flanged Instrumountings	The Flanged Instrumountings protects sensitive equipment from external vibration and shock forces.	59
Fluid Mount	This load bearing spring with restrained motion capability has additional features such as high dampening to deliver decreased motion near resonance frequencies and an isolator to provide vibration isolation at a specified frequency.	60
GK	Novibra® mounting type GK is specifically designed for isolation of heavy machinery with low interfering frequencies. It is widely used under concrete foundations supporting heavy machinery.	61
Height Adjusters	The height adjuster is supplied complete with washer and nut for fastening to the mounting and two nuts and a lock washer for the engine foot fastening.	62
Hourglass Spring	Ideal for mass transit applications. Due to its solid nature, the hourglass delivers additional benefits such as reduced maintenance costs, long service life and improved ride characteristics, as well as expelling the need for complex air supply systems.	63 - 64
Level Mount	Designed for specific use within workshop machinery, the level mount can be installed in minutes.	65
Low Frequency Mountings	The Low Frequency mounting is designed to give large deflection for small loads and are used to protect instruments etc, against vibration and impact, and also to isolate light apparatus from external vibration and shock.	66
M-Mount	Type M is ideal for applications involving isolation of low frequency vibrations in all planes. Also suitable for shock attenuation due to the designed ability to provide large deflection while providing passive vibration isolation. Typical applications are electronic instruments, measuring equipment and test cells.	67
MCR	MCR mountings are designed for mobile applications where the disturbing frequencies are high and restricted movement is needed.	68
MDS	Designed to take high dynamic shock loads whilst limiting mount movements in all directions, with 2 part single bolt installation. No requirement for radius or chamfered hole.	69 - 70
Metaxentric Bushes	Similar to conventional Ultra Duty Bushes but with inner and outer sleeves offset radially. This feature provides a greater rubber thickness and hence increased flexibility in the normal direction of loading while maintaining control in other modes and still allowing torsional movement.	71
Metacone	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 in combined shear and compression. Suitable for both engine and cab suspension in mobile applications.	72 - 74

Product List

ANTI-VIBRATION PRODUCTS		
Metacone Primary Spring	The Metacone Primary Spring is an easily fitted and compact suspension unit in which the rubber is loaded in combined shear and compression.	75
Novibra AV Plate	The Anti-Vibration Plate is intended, primarily, for applications with low demands on vibration isolation.	76
RA Mount	For effective isolation of vibration and noise on machines with rotating movements.	77 - 78
RAB	For effective isolation of vibration and noise on machinery with rotating movements. Especially suitable for 1-, 2- and 3-cylinder engines.	79
RAEM	The RAEM is a universal mounting for applications demanding maximum vibration isolation.	80
Rectangular SAW Mount	Widely used for suspending engines on road vehicles and may also be used as springs for vibratory equipment.	81
Sandwich Mount	This range of mountings is suited to the suspension of heavy equipment and machinery and is extensively used as a flexible mounting for large medium speed diesel marine propulsion units.	82
SAW Mount	Novibra® type SAW is heavy-duty mountings for high vertical static and shock loads in compression. Provides high isolation in the horizontal shear direction	83
SE Mount	Novibra® type SE is suitable for the isolation of high frequency disturbances and also provides reduction of structure-borne noise.	84
Shear Mount	Also known as 'Sandwich' mountings because they feature a rubber section sandwiched between plates of metal. Widely used for suspending engines on road vehicles and may also be employed as springs for vibratory equipment.	85
Spherilastik Bearings	Typical uses include traction and braking reaction rods for rail, road and off-highway vehicles, hydraulic damper fixings and other applications where a high duty bearing of compact size is required.	86
Super D	The Super D mount range is designed primarily for heavy marine installations requiring increased shock capacity.	87 - 88
Tilt Cab Mount	The Trelleborg Tilt Cab Mount (TCM) is specially designed for high levels of vibration isolation while simultaneously controlling axial movements with an integral buffer, the combination of isolator and buffer results in the mounting functioning with increased effectiveness over a conventional multi-mount system.	89
Two Bolt Instrumount	Two Bolt Instrumountings provide a convenient and effective means of isolating vibration generated by lightweight machinery.	90
UD	For vehicle suspension, pivot arms and all types of mechanical linkage, permits oscillating movement through the deflection of rubber in shear. Suitable to replace roller bearings where small motions are required (up to 20 degrees). Reduces shock loads and noise transmission in structures.	91
UH	Novibra® mounting type UH is particularly suitable for the suspension of both mobile and static cabs as well as platforms on agricultural vehicles.	92
Vee Mount	A high load capacity mounting with large rubber volume providing a high degree of vibration and noise isolation. Ideally suited for suspending engines installed in public service and goods vehicles.	93
VT	Novibra® type VT protects wall-mounted instrument cabinets from vibrations and shocks generated by nearby engines, workshop machinery.	94

MountFinder Pro

Find your perfect anti-vibration mount with the new MountFinder Pro mobile application.

MountFinder Pro directly measures your machines RPM to help determine the very best anti-vibration solution for your application.

Available for download now from iTunes and the Google Play store.





The use of rubber as a spring material

Vibration isolation is based on installing machinery on springs or resilient material of known stiffness and damping.

The types of spring material which are used most often are rubber and steel. Another alternative is air springs.

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

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

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

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

Rubber springs however feature many unique characteristics such as high intrinsic damping which helps the designer keep vibration amplitudes to a minimum whilst simultaneously reducing high frequency structure borne noise.

To allow their properties to be fully utilized, Trelleborg Industrial AVS rubber mountings are available in various hardness grades and polymer types.

Rubber as an engineering material

Compared with other engineering materials, rubber is very ductile. In some cases, the elongation may be higher than 500%, and by far the highest proportion of this strain is elastic. Metals, on the other hand, have very small strains below the elastic limit. Compared with metals, the tensile strength of rubber is low. The maximum level that can be achieved with rubber is 25-30 MPa. However, because of the high strain, rubber has a very large work absorption capacity compared with the best grade of steel.

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

High elasticity ductility

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

Damping capacity

Damping capacity is an additional important feature of compound rubber. This is of particular importance when operating a machine that is supported on springs through the resonance range. In Fig.1 you can see the principle difference between an almost ideal spring and a rubber spring. The resonance deflection with rubber springs is only 1/5 to 1/50 compared with the deflection when using steel springs with the same stiffness, see Fig.2. With a spring made of natural rubber working with compression or shear load, the direct loss of energy is between 6 and 30% depending on the hardness of the rubber. The energy loss is such that it is possible in many cases to use rubber springs as dampers. Care must be taken when it comes to damping in a rubber element. If the element works with high amplitudes, a substantial amount of energy is converted into heat, and the heat which is generated may cause the rubber element to be destroyed see Fig.3. In the case of simple impact, the vibration sequence will be as shown in Fig.4. The left-hand curve represents a steel spring, while the right hand curve represents a rubber spring. These two curves clearly show how quickly the vibrations degenerate in the rubber, while in the steel springs they diminish slowly.

Sound insulation

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

Environmental conditions

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

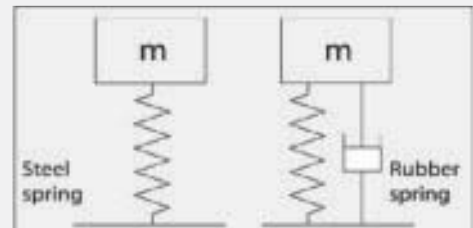


Fig. 1. Schematic difference between rubber spring and steel spring.

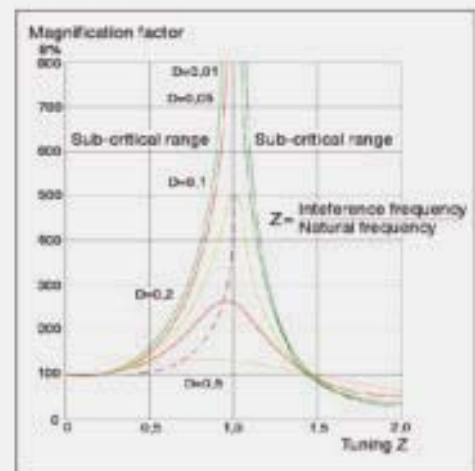


Fig. 2. Resonance curve for spring material with different internal damping.

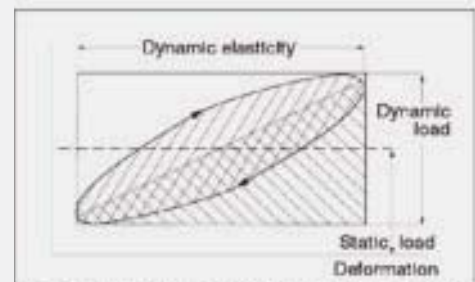


Fig. 3. Schematic representation of the internal damping properties of rubber. The elliptical area indicates the loss of energy.

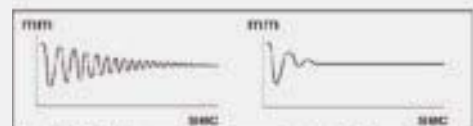


Fig. 4. Vibrations sequence with single impact for steel and rubber springs.

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

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. 5 show alternative methods of determining stiffness.

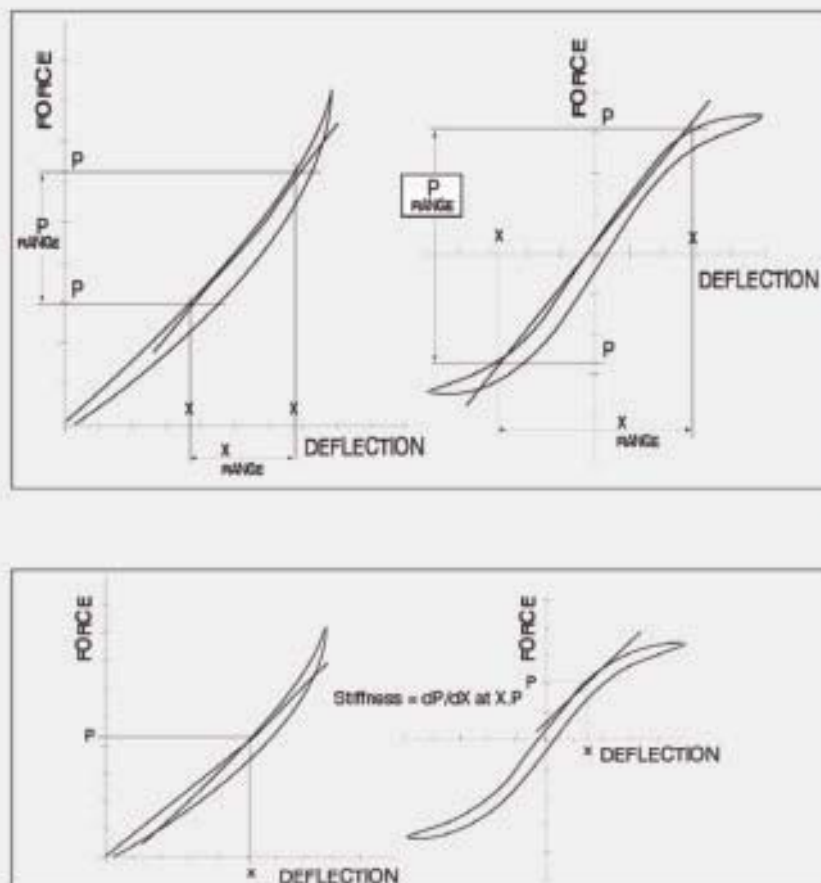


Fig. 5. dP/dX at XP average gradient over P (or X) range (usually derived by least squares method of curve fitting).

Typical Compound Properties

COMMERCIAL NAME INTERNATIONAL DESIGNATION	BUTYL RUBBER IIR	ACRYLONITRILE BUTADIENE RUBBER NBR	NATURAL RUBBER NR
Hardness range IRH	45 - 70	40 - 70	35 - 80
Temperature range	-40 to + 120°C	-40 to + 130°C	-40 to + 70°C
Properties			
Creep performance	Moderate	Moderate	Good
Fatigue performance	Good	Moderate	Very Good
High temperature performance	Good	Good	Moderate
Low temperature performance	Good	Good	Good
Physical strength	Good	Good	Excellent
Resistant to			
Acids	Very Good	Conditional	Conditional
Oil and greases	Not Suitable	Excellent	Not Suitable
Ozone	Very Good	Moderate	Moderate
Petrol	Not Suitable	Excellent	Not Suitable
Solvents, Aliphatic	Not Suitable	Very Good	Not Suitable
Solvents, Aromatic	Not Suitable	Conditional	Not Suitable
Solvents, Halogen	Not Suitable	Bad	Not Suitable
Water	Good	Good	Good
Durability	Good	Very Good	Very Good

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. 6.

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 across in Fig. 7.

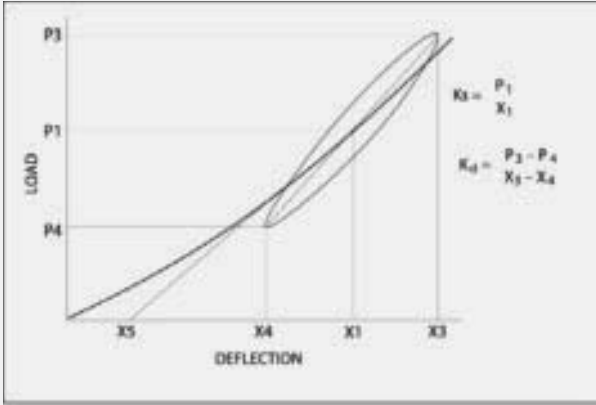


Fig. 6.

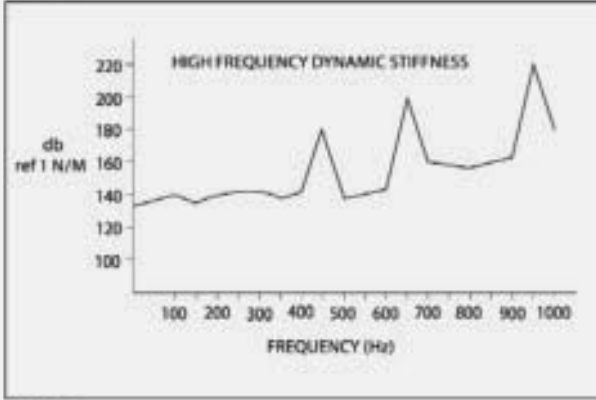


Fig. 7.

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

Gough-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 Gough-Joule effect. For pairs of springs (Fig.9.) shown a 10°C rise in temperature will cause an increase in clearance by approximately 4.5% of the nominal static deflection. See Fig.10.

Stiffness of a Rubber Spring

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

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

Fig. 11 illustrates the relationship between rubber hardness and shear modulus, and fig. 12 the dependence of the bulk modulus on the shape factor. The latter curve applies at 10% deformation.

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

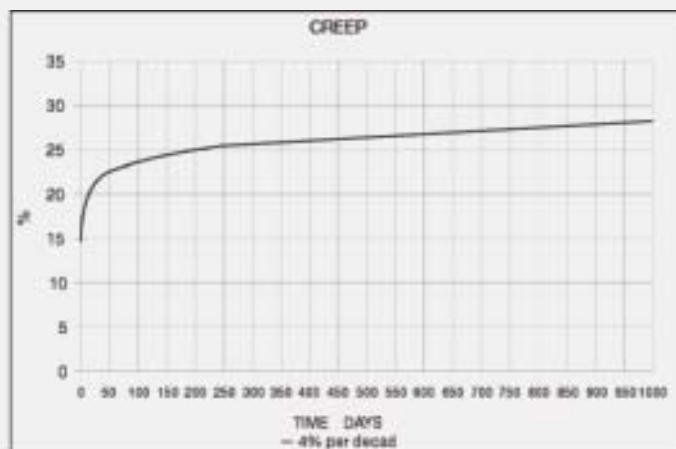


Fig. 8.

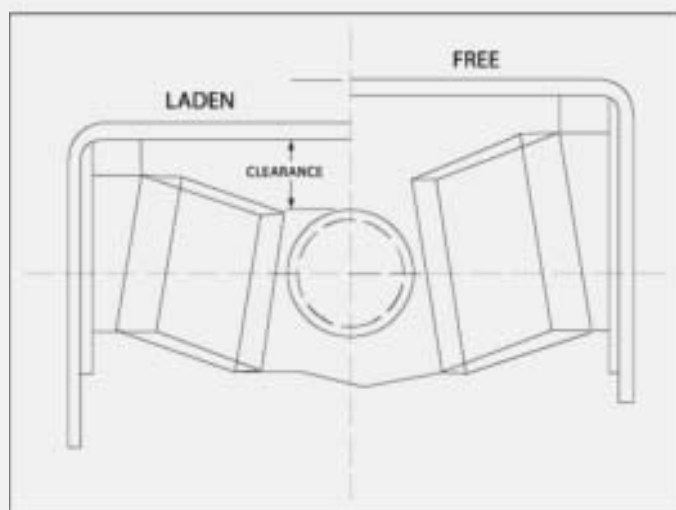


Fig. 9.

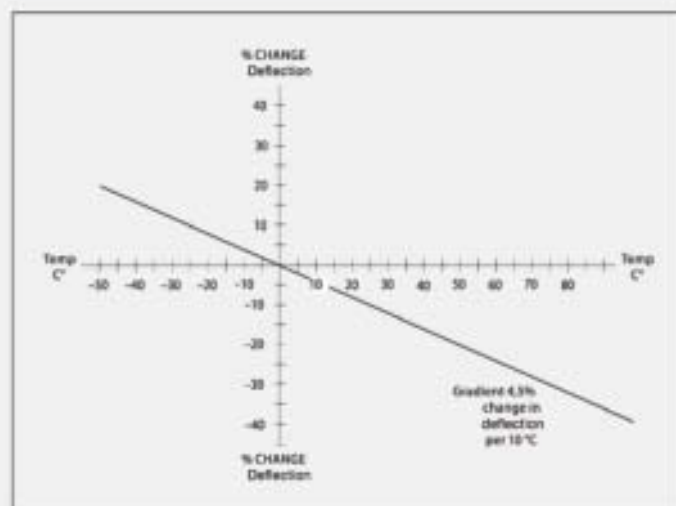


Fig. 10.

Selecting an anti-vibration mount

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

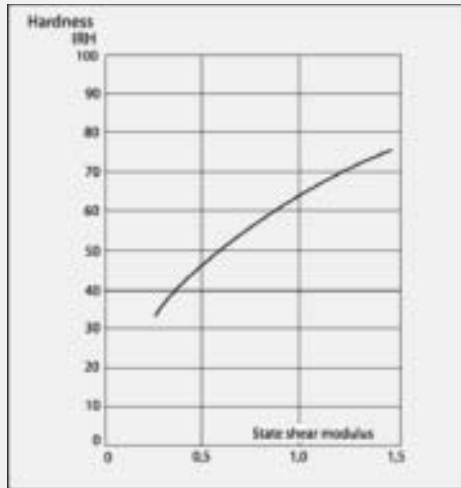


Fig. 11. Relationship between rubber hardness and shear modulus.

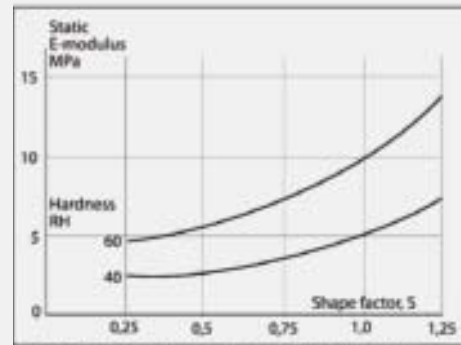


Fig. 12. The dependence of the compression modulus upon the shape factor.

	SYMBOL	MEASUREMENT	DESCRIPTION
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.
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	K _{stat}	(N/m)	The force required in Newtons to compress the mounting 1 m.
Dynamic Spring Stiffness	K _{dyn}	(N/m)	Spring stiffness when an alternating force is applied.
Tuning Ratio	Z	(-)	The ratio between interference frequency f and natural frequency f _o .
Interference Force	F _s	(N)	The force transmitted to the base of an isolated machine.
Impulse Force	F _i	(N)	The force transmitted to the base of a rigidly mounted machine.
Magnification Factor	B	(-)	The part of the impulse force which is transmitted as a vibration force. Indicates the relation between the interference force F _s and impulse force F _i .
Level of Isolation	I	(-)	The part of the impulse force which is eliminated by the vibration isolation, (1-B) or, if B is expressed as a percentage, (100-B).
Damping Coefficient	C	(Ns/m)	The linear viscous damping coefficient.
Critical Damping	C _{kr}	(Ns/m)	The linear viscous damping coefficient at critical damping. A system is said to be critically damped if it returns to its initial static position without any over-oscillation after a displacement.
Damping Factor	D	(-)	The ratio between C and C _{kr} .
Reduction	R	(dB)	Isolation expressed in decibels.
Deflection	δ _{stat}	(mm)	The static deflection for a spring.

Calculations

Calculation of deflection

When calculating deflection the following formula shall be used.

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

Calculation of isolation degree

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

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

Tuning: $Z = f/f_o$

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

The factor D depends on the internal damping of the spring material. In rubber D has the value 0.04-0.1 depending on hardness of the rubber. The term $4D^2Z^2$ 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 direct 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. 2 on page 12.

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

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

The relative magnitude of the transmission of force depends entirely on the tuning ratio Z. If Z is high, the force transmission percentage will be small.

As can be seen in Fig. 13, 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 - 96 % of interference forces are eliminated.

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

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

1. Rigidly mounted machines transmit vibration forces in unchanged form to the base, which is therefore forced to be a part of the movement of the machine. The magnification factor can be regarded as being 100%.
2. In the case of an unsuitable spring system, the magnification factors will increase considerably and may amount to several hundred percent.
3. The force transmission percentage is reduced substantially by correct calculation and suitable mountings being installed between the machine and base. Typical reductions can be from 100 down to 10%, but in favourable circumstances can be as low as 2%.

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

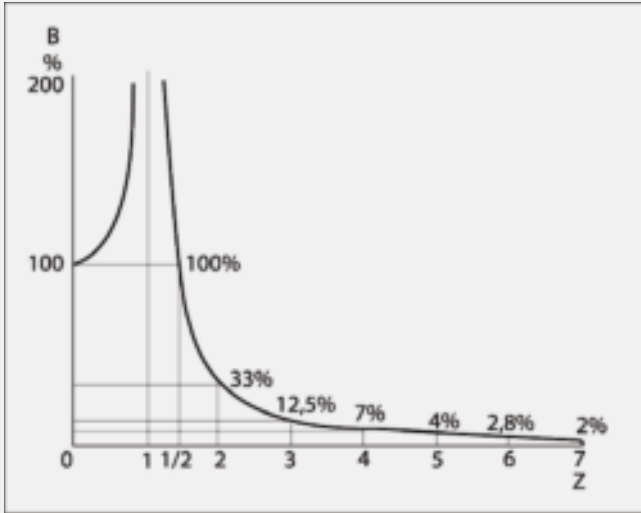


Fig. 13 Resonance curve.

Shock isolation

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

A shock pulse can normally be defined 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_0 Hz, then the product must be $\tau f_0 < \text{approx. } 0.25$ if the isolation is to provide protection against the shock.

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

Storage

There may be changes in appearance and physical properties of rubber products during storage, particularly if adverse condition apply. ISO 2230 provides an ideal guide to the most suitable storage conditions, including:

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

Unit conversion

MULTIPLY	BY	TO OBTAIN
Feet	0.30480	Meters
Inches	0.02540	Meters
Pounds	0.453	Kilograms
Pound/Force	4.45	Newtons
Feet/Second	0.3048	Meters/Second
Inches/Second	0.0254	Meters/Second
Feet/Second ²	0.3048	Meters/Second ²
Inches/Second ²	0.0254	Meters/Second ²

Important Considerations

- Flexible connections to the machine are required in order to achieve effective isolation. The application of Trelleborg expansion joints can be recommended.
- If required, there should be grounding for removing static electricity.

ANB

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

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

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

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

Typical applications include:

- Lifting cranes
- Forestry vehicles
- Material handling equipment



Technical Drawings

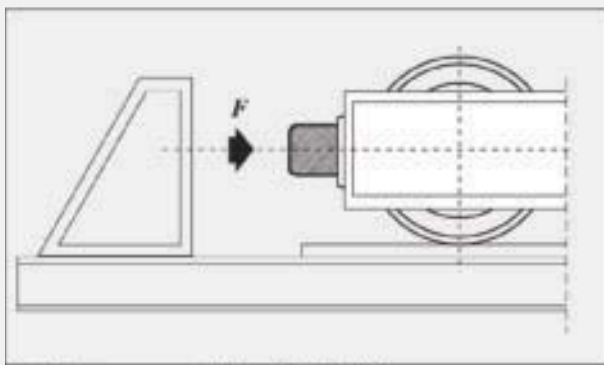
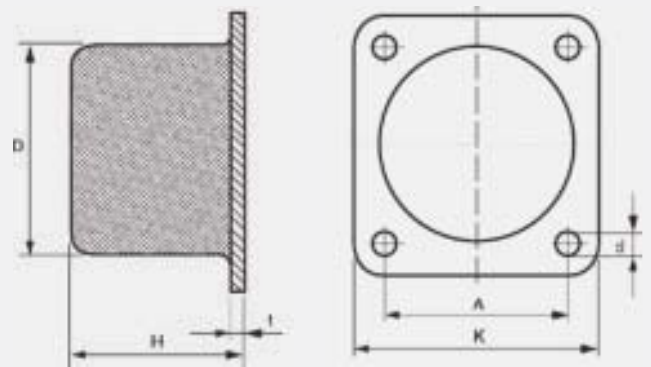


Fig. 1. Traverse crane with shock buffer ANB.

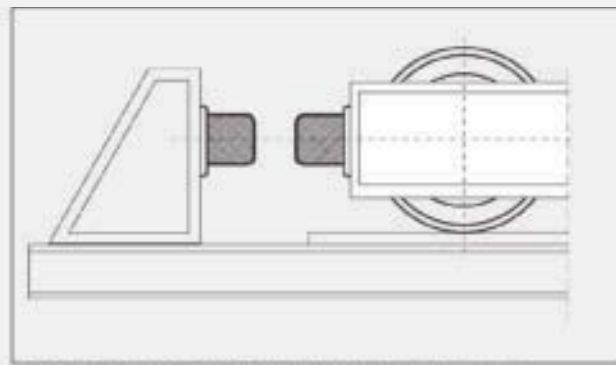


Fig. 2. Traverse crane with 2 ANB buffers connected in series.

Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)						MAX LOAD (kN)	WEIGHT (kg)
			A	D	d	H	t			
15-4034	10-00151	ANB50	70	50	50	7	43	3	8	0.2
15-4035	10-00152	ANB75	100	75	75	9	63	3	20	0.5
15-4037	10-00153	ANB100	130	100	100	11	84	4	41	1.2
15-4032	10-00010	ANB150	185	150	150	13.5	126	6	90	3.9
15-4033	10-00011	ANB200	240	200	200	13.5	168	8	180	9.1

Axle Tower Spring

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

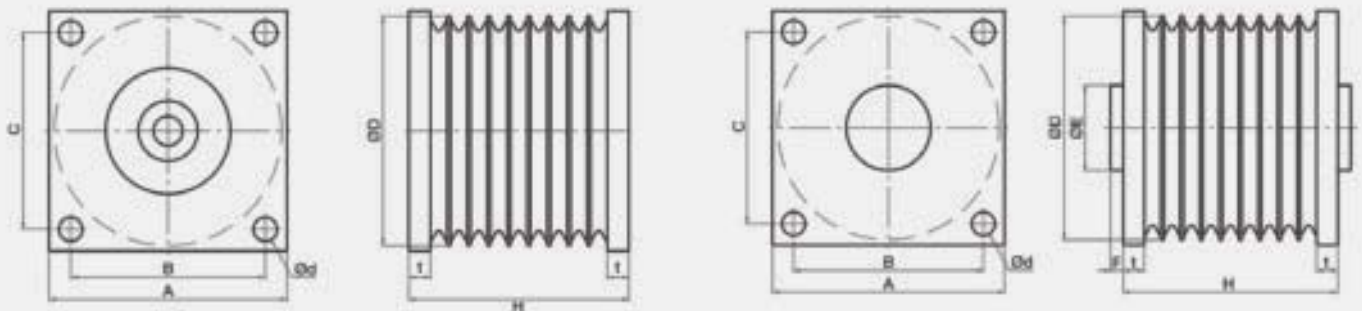
There is also a built in fail-safe device to prevent damage in the case of severe tensile overload. These devices are also manufactured from the highest-grade steel to provide high tensile strength without compromising ductility.

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

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



Technical Drawings



Product Data

PART No.	DRAWING No.	DIMENSIONS (mm)									MAX LOAD (kN)	FAILSAFE SYSTEM	WEIGHT (kg)
		A	B	C	D	d	E	F	H	t			
10-03501	17-1831	170	140	140	165	14	55	18	150	9.5	55	CHAIN	9.5
10-00951	17-1832-1	190	150	160	184	16.5	80	25	185	10	70	CHAIN	15
10-01640	17-4729-01	190	150	160	180	17	-	-	180	15	150	BOLT	15.6
10-01641	17-4735-00	190	150	160	180	17	-	-	182	15	150	BOLT	16.4
10-01677	17-4736-00	220	180	180	210	22	-	-	203	20	400	BOLT	25

BA and Double U-Shear

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

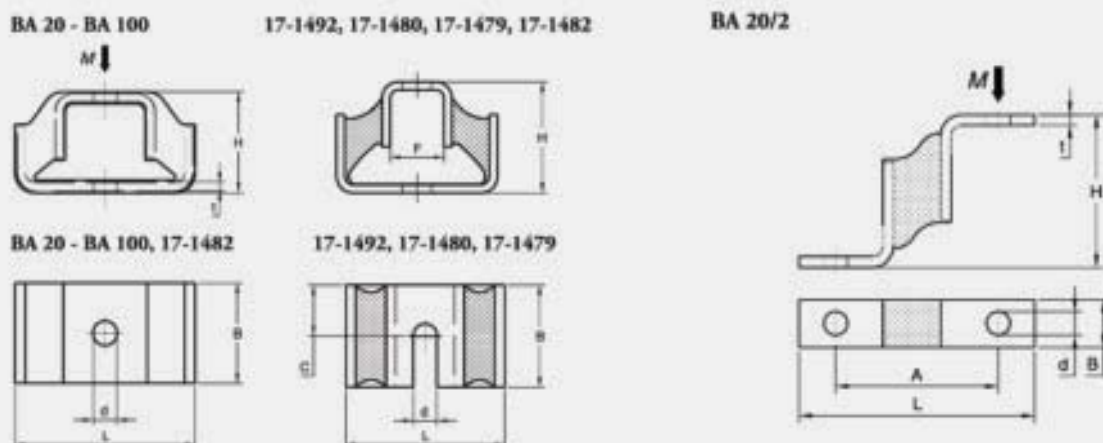
The mountings utilize bonded rubber in shear to permit relatively high deflections, providing excellent isolation of low frequencies. (Type BA 20/2 is a half section suitable for very light loads). On rotating equipment applications the soft axis should be at right angles to the shaft. On mobile applications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



Typical applications include:

- Light fans and compressors
- Portable gensets and pumps
- Computers and electronic units
- Measuring and test equipment

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)	WEIGHT (kg)	
			B	L	H	A	F	C	d	t			
BA													
17-4345	10-00005	BA 20/2 40 IRH	20	90	58	62	-	-	8	4	12	0.09	
17-4345	10-00006	BA 20/2 60 IRH	20	90	58	62	-	-	8	4	27	0.09	
17-4035	10-00145	BA 20 40 IRH	20	90	50	-	-	-	10	4	20	0.16	
17-4035	10-00146	BA 20 60 IRH	20	90	50	-	-	-	10	4	35	0.16	
17-4036	10-00147	BA 50 40 IRH	50	90	50	-	-	-	12	4	60	0.42	
17-4036	10-00148	BA 50 60 IRH	50	90	50	-	-	-	12	4	110	0.42	
17-4037	10-00149	BA 100 40 IRH	100	90	50	-	-	-	15	4	130	0.83	
17-4037	10-00150	BA 100 60 IRH	100	90	50	-	-	-	15	4	250	0.83	
DOUBLE U-SHEAR													
17-1492	10-00518	40 IRH	19	60	43	-	19	10.3	6.7	3	14	0.09	
17-1492	10-00519	50 IRH	19	60	43	-	19	10.3	6.7	3	20	0.09	
17-1482	10-00515	40 IRH	51	60	41	-	20	25	11	3	37	0.2	
17-1482	10-00516	50 IRH	51	60	41	-	20	25	11	3	56	0.2	
17-1480	10-00511	40 IRH	51	80	78	-	32	25	13	5	70	0.6	
17-1480	10-00512	50 IRH	51	80	78	-	32	25	13	5	100	0.6	
17-1479	10-00509	40 IRH	64	86	108	-	38	32	16.7	5	150	1.1	
17-1479	10-00510	50 IRH	64	86	108	-	38	32	16.7	5	220	1.1	

Bearer Springs

Metalastik® Bearer Springs provide a bearing medium between rail vehicle bodies and bogies and are operating worldwide in various suspension applications including locomotives, passenger and freight vehicles

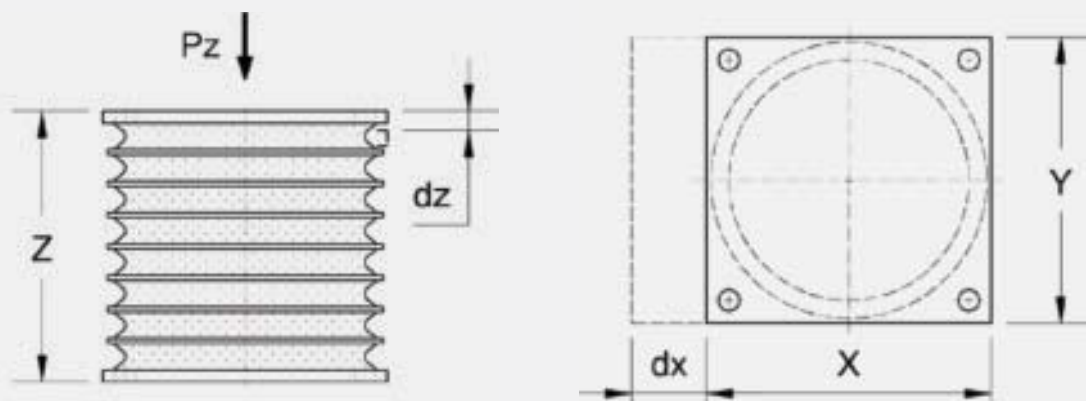
Conventional circular and rectangular bearer springs are designed to support the vehicle body in their compression mode whilst allowing horizontal, lateral and rotational bogie movements by virtue of the more flexible shear mode.

Waisted Type Bearer Springs offer optimized performance within limited space envelopes, particularly where large horizontal displacements require to be accommodated.



Circular: 55 - 85 mm Horizontal Deflection

Technical Drawing



Product Data

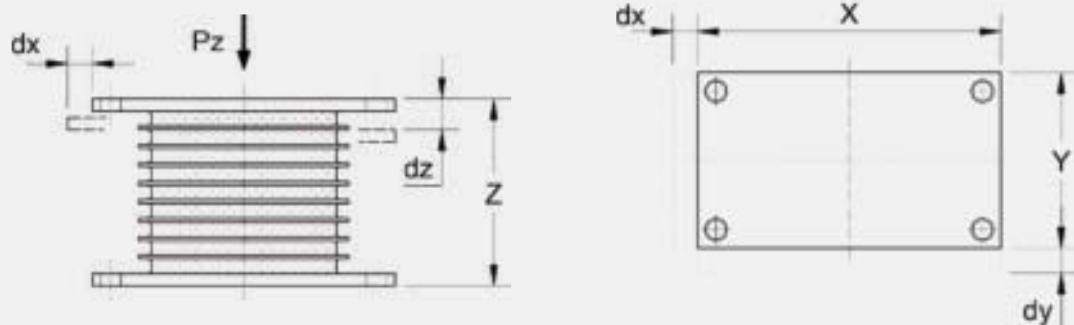
DRAWING No.	DIMENSIONS (mm)			MAX LOAD P_z^* (kN)	VERTICAL STIFFNESS (kN/mm)	VERTICAL DEFLECTION d_z (mm)	HORIZONTAL DEFLECTION d_x (mm)	$P_z \cdot d_x$	WEIGHT (kg)
	X	Y	Z						
17-1139	170	170	150	54	4.7	11	56	1350	9
17-1526	190	190	180	100	6.3	14	71	2700	13.5
17-1374	280	195	220	100	6.1	15	76	2700	28
17-1326	292	292	213	180	9.5	17	85	7600	33

* Bearer Springs should not be used at both maximum vertical load capacity and maximum shear deflection. Hence, for any round or square Bearer Spring the multiple of P_z (vertical load) and d_x (shear deflection) should be less than the value quoted in the table.

Bearer Springs Continued

Rectangular: 55 - 108 mm Shear Deflection

Technical Drawing

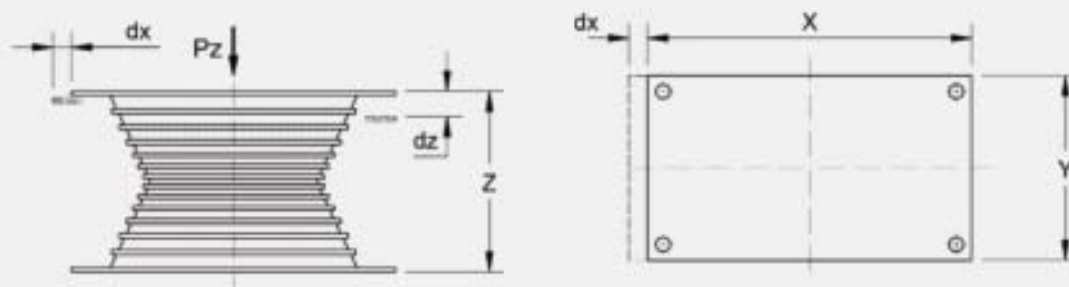


Product Data

DRAWING No.	DIMENSIONS (mm)			MAX LOAD P_z (kN)	VERTICAL STIFFNESS (kN/mm)	VERTICAL DEFLECTION dz (mm)	LONGITUDINAL DEFLECTION dx (mm)	LATERAL DEFLECTION dx (mm)	$P_z \cdot dx$	$P_z \cdot dy$	$P_z \cdot (dx+dy)$	WEIGHT (kg)
	X	Y	Z									
17-1633	246	216	162	275	25	11	54	42	7340	4810	6360	23.2
17-1761	306	211	188	240	20	12	61	50	7320	6000	6930	31.8
17-1341	349	210	178	350	25	14	65	46	11400	7000	9560	31.1
17-2113	351	217	164	73	6	13	66	48	2400	1600	2040	26
17-2079	360	220	182	126	8	14	70	45	7670	4900	6670	23
17-1279	432	241	218	95	5	17	83	52	3940	2440	3940	42
17-1172	432	241	216	300	17	16	83	50	12400	7900	11800	49
17-1260	330	191	299	41	1.4	27	108	81	2160	1600	2160	35
17-1853	230	192	180	90	6	14	69	56	3100	2700	3020	21

Waisted: <140 mm Shear Deflection

Technical Drawing

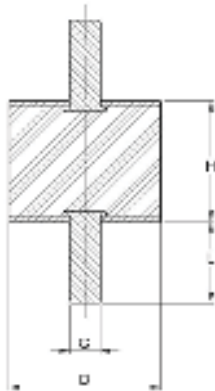


Product Data

DRAWING No.	DIMENSIONS (mm)			MAX LOAD P_z^* (kN)	VERTICAL DEFLECTION dz (mm)	LONGITUDINAL DEFLECTION dx (mm)	WEIGHT (kg)
	X	Y	Z				
17-1665	387	220	215	120	4	110	37.3
17-1762	395	368	268	160	12.5	140	49

Bobbin - Type A

Technical Drawing



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

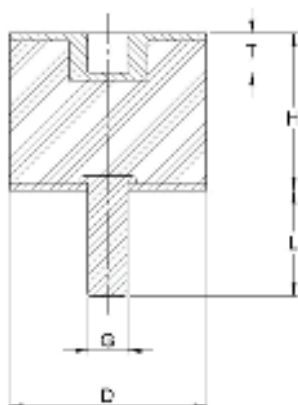
Figures stated are for natural rubber hardness 60° IRH.

Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)				COMPRESSION		SHEAR		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			D	H	G	L	MAX LOAD (kg)	MAX DEFLECTION (mm)	MAX LOAD (kg)	MAX DEFLECTION (mm)		
19-0272	20-01435	A10/10	10	10	M4	10	4	0.9	2	2	1.6	0.004
19-0400	20-01066	A10/15	10	15	M4	10	4	1.2	2	3.1	1.6	0.006
19-0294	20-01067	A15/10	15	10	M4	10	12	0.9	4	2.8	1.6	0.006
19-0769	20-01068	A15/15	15	15	M4	10	10	1.5	4	3.2	1.6	0.006
19-0296	20-00418	A20/10	20	10	M6	15/18	17	0.5	7	1.4	8.3	0.013
19-0383	20-01226	A20/15	20	15	M6	18	16	1.2	7	2.6	8.3	0.016
19-0384	20-00541	A20/20	20	20	M6	15/18	16	1.7	7	4.5	8.3	0.016
19-0387	20-01228	A20/25	20	25	M6	15/18	15	2.1	6	6.2	8.3	0.023
19-0297	20-00557	A25/10	25	10	M6	18	31	0.8	12	1.5	8.3	0.028
19-0415	20-00558	A25/15	25	15	M6	18	30	1.5	11	2.5	8.3	0.030
19-0416	20-00559	A25/20	25	20	M6	18	29	2.6	11	3.8	8.3	0.024
19-0419	20-01437	A25/25	25	25	M6	18	27	2.7	11	5.4	8.3	0.031
19-0421	20-01629	A25/30	25	30	M6	18	25	3.4	9	6.7	8.3	0.035
19-0267	20-01536	A30/15	30	15	M8	20	51	0.9	17	2.6	20	0.045
19-0388	20-01438	A30/20	30	20	M8	20	45	1.7	17	3.9	20	0.050
19-0389	20-01440	A30/25	30	25	M8	20	41	2.1	16	5.3	20	0.035
19-0392	20-01441	A30/30	30	30	M8	20	39	2.9	15	6.6	20	0.057
19-0393	20-00438	A30/40	30	40	M8	20	31	4	10	10	20	0.065
19-0268	20-01423	A40/20	40	20	M8	23	92	1.5	31	3.8	20	0.078
19-0395	20-01443	A40/30	40	30	M8	23	71	2.4	31	6.6	20	0.090
19-0397	20-00563	A40/40	40	40	M8	23	66	3.5	27	9	20	0.110
19-0270	20-01444	A50/20	50	20	M10	28	204	2.1	51	3.6	40	0.139
19-0401	20-00564	A50/25	50	25	M10	28	143	2.5	51	4.6	40	0.149
19-0402	20-01445	A50/30	50	30	M10	28	143	3.2	51	6.4	40	0.160
19-0533	20-01714	A50/35	50	35	M10	25	133	3.5	51	8	40	0.168
19-0404	20-01446	A50/40	50	40	M10	28	112	3.8	46	8.5	40	0.180
19-0405	20-00882	A50/45	50	45	M10	28	107	4.1	46	10.1	40	0.191
19-0407	20-00549	A50/50	50	50	M10	28	107	4.8	43	11.7	40	0.205
19-0305	20-01447	A70/35	70	35	M10	25	245	4.5	92	9	40	0.210
19-0512	20-01253	A70/45	70	45	M10	28	235	4.2	92	9.9	40	0.346
19-0306	20-00547	A75/40	75	40	M12	37	296	3.6	102	4.9	70	0.437
19-0513	20-01027	A75/50	75	50	M12	37	286	5.2	102	11.2	70	0.480
19-0514	20-00548	A75/55	75	55	M12	37	255	5.2	102	12.5	70	0.526
19-0273	20-01259	A100/40	100	40	M16	41	673	3.9	204	8.2	170	0.884
19-0412	20-00568	A100/55	100	55	M16	41	520	6.1	204	12.4	170	1.020

Bobbin - Type B

Technical Drawing



Figures stated are for natural rubber hardness 60° IRH.

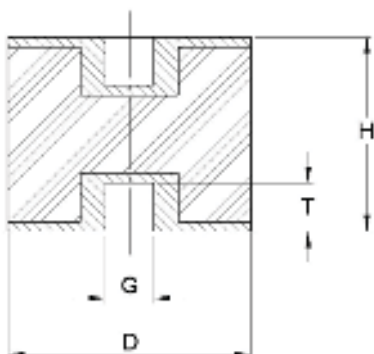
The technical values are to be used for info only. If you have any questions, please contact TIAVS.

Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					COMPRESSION		SHEAR		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			D	H	G	L	T	MAX LOAD (kg)	MAX DEFLECTION (mm)	MAX LOAD (kg)	MAX DEFLECTION (mm)		
19-0307	20-01449	B10/10	10	10	M4	10	4	6	0.9	1	2.3	1.6	0.003
19-0515	20-00794	B10/15	10	15	M4	10	4	5	1.5	2	3.8	1.6	0.003
19-0529	20-01698	B15/15	15	15	M4	10	5	12	1.4	5	3.8	1.6	0.007
19-0310	20-01264	B20/15	20	15	M6	18	6	16	0.9	11	3.8	8.3	0.017
19-0524	20-01265	B20/20	20	20	M6	18	6	16	1.2	9	5	8.3	0.019
19-0526	20-01266	B20/25	20	25	M6	18	6	15	2.5	9	6.3	8.3	0.020
19-0311	20-01267	B25/15	25	15	M6	18	6	30	1.3	16	3.8	8.3	0.024
19-0539	20-01268	B25/20	25	20	M6	18	6	29	2.1	15	5	8.3	0.026
19-0540	20-00573	B25/25	25	25	M6	18	6	27	2.9	14	6.3	8.3	0.029
19-0541	20-01016	B25/30	25	30	M6	18	6	25	3.2	14	7.5	8.3	0.031
19-0542	20-01269	B30/15	30	15	M8	20	8	69	1.4	21	3.4	20	0.041
19-0543	20-00898	B30/20	30	20	M8	20	8	39	1.6	21	5	20	0.047
19-0546	20-00464	B30/25	30	25	M8	20	8	38	2.3	20	6.3	20	0.051
19-0547	20-00575	B30/30	30	30	M8	20	8	36	2.8	19	7.5	20	0.050
19-0549	20-01539	B30/40	30	40	M8	20	10	31	3.2	10	8	20	0.050
19-0554	20-00466	B40/30	40	30	M8	20	8	61	2.4	35	7.5	20	0.090
19-0555	20-00821	B40/40	40	40	M8	23	8	61	3.8	34	10	20	0.107
19-0556	20-01273	B50/20	50	20	M10	28	10	133	1	46	4	40	0.121
19-0559	20-00577	B50/30	50	45	M10	28	10	122	2.6	51	7	40	0.145
19-0558	20-00578	B50/40	50	40	M10	28	10	112	3.6	32	10	40	0.167
19-0561	20-01276	B50/50	50	50	M10	28	10	107	5.1	51	12.5	40	0.190
19-0848	20-00822	B60/40	60	40	M10	28	10	178	4.6	71	6.3	40	0.200
19-0536	20-01283	B75/50	75	50	M12	37	12	265	4.3	121	12.5	70	0.470
19-0537	20-00824	B75/55	75	55	M12	37	12	245	4.7	119	13.8	70	0.501
19-0322	20-00581	B100/40	100	40	M16	41	16	663	3.2	236	10	170	0.853
19-0535	20-01285	B100/55	100	55	M16	41	16	520	5	222	13.8	170	0.970
19-0849	20-01286	B100/60	100	60	M16	41	16	510	5.6	217	15	170	1.041

Bobbin - Type C

Technical Drawing



Figures stated are for natural rubber hardness 60° IRH.

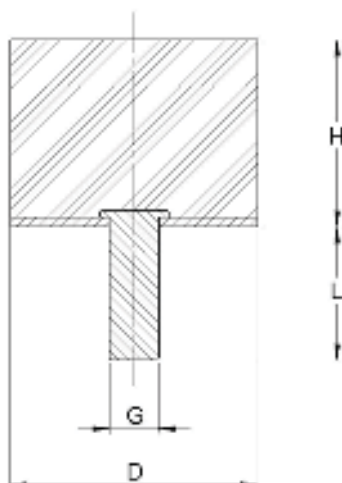
The technical values are to be used for info only. If you have any questions, please contact TIAVS.

Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)				COMPRESSION		SHEAR		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			D	H	G	T	MAX LOAD (kg)	MAX DEFLECTION (mm)	MAX LOAD (kg)	MAX DEFLECTION (mm)		
19-0324	20-00095	C10/10	10	10	M4	4	10	1.6	1	1.2	1.6	0.003
19-0325	20-00583	C15/15	15	15	M4	4	12	1.5	4	2	1.6	0.006
19-0551	20-01289	C20/20	20	20	M6	4/6	17	1.6	5	2.5	8.3	0.015
19-0552	20-00584	C20/25	20	25	M6	6	15	2.2	4	2.7	8.3	0.015
19-0553	20-00363	C20/30	20	30	M6	6	12	2.5	4	3	8.3	0.017
19-0327	20-01291	C25/20	25	20	M6	6	29	1.7	9	3	8.3	0.024
19-0424	20-01292	C25/25	25	25	M6	6	27	2.2	8	3.5	8.3	0.021
19-0328	20-00475	C30/25	30	25	M8	8	38	2.2	12	3.6	20	0.037
19-0427	20-01455	C30/30	30	30	M8	10	36	2.6	11	4.1	20	0.047
19-0430	20-01075	C30/35	30	35	M8	8	44	3.1	21	9.4	20	0.050
19-0812	20-00476	C30/40	30	40	M8	8	44	3.6	21	10.9	20	0.052
19-0329	20-00551	C40/30	40	30	M8	8	71	2.7	25	5.2	20	0.092
19-0423	20-00587	C40/40	40	40	M8	8	66	3.9	25	7.4	20	0.105
19-0330	20-01456	C50/30	50	30	M10	10	122	2.4	41	5.2	40	0.140
19-0434	20-00116	C50/35	50	35	M10	10	117	2.9	41	6.4	40	0.140
19-0436	20-01457	C50/40	50	40	M10	10	112	3.3	41	7.4	40	0.170
19-0438	20-01025	C50/45	50	45	M10	10	107	4.1	41	8.6	40	0.169
19-0440	20-01313	C50/50	50	50	M10	10	107	4.9	41	9.7	40	0.182
19-0447	20-01318	C75/40	75	40	M12	12	296	3.2	92	7	70	0.396
19-0448	20-01541	C75/45	75	45	M12	12	280	3.5	92	8	70	0.423
19-0450	20-01320	C75/50	75	50	M12	12	265	4.1	92	9	70	0.445
19-0451	20-00125	C75/55	75	55	M12	12	245	4.6	92	10.1	70	0.478
19-0332	20-01324	C100/40	100	40	M16	16	663	2.9	153	5.6	170	0.794
19-0446	20-01325	C100/55	100	55	M16	16	520	4.9	153	9.1	170	0.933

Bobbin - Type D

Technical Drawing



Figures stated are for natural rubber hardness 60° IRH.

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Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)				COMPRESSION		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			D	H	G	L	MAX LOAD (kg)	MAX DEFLECTION (mm)		
19-0324	20-00095	C10/10	10	10	M4	4	10	1.6	1.6	0.003
19-0325	20-00583	C15/15	15	15	M4	4	12	1.5	1.6	0.006
19-0551	20-01289	C20/20	20	20	M6	4/6	17	1.6	8.3	0.015
19-0552	20-00584	C20/25	20	25	M6	6	15	2.2	8.3	0.015
19-0553	20-00363	C20/30	20	30	M6	6	12	2.5	8.3	0.017
19-0327	20-01291	C25/20	25	20	M6	6	29	1.7	8.3	0.024
19-0424	20-01292	C25/25	25	25	M6	6	27	2.2	8.3	0.021
19-0328	20-00475	C30/25	30	25	M8	8	38	2.2	20	0.037
19-0427	20-01455	C30/30	30	30	M8	10	36	2.6	20	0.047
19-0430	20-01075	C30/35	30	35	M8	8	44	3.1	20	0.050
19-0812	20-00476	C30/40	30	40	M8	8	44	3.6	20	0.052
19-0329	20-00551	C40/30	40	30	M8	8	71	2.7	20	0.092
19-0423	20-00587	C40/40	40	40	M8	8	66	3.9	20	0.105
19-0330	20-01456	C50/30	50	30	M10	10	122	2.4	40	0.140
19-0434	20-00116	C50/35	50	35	M10	10	117	2.9	40	0.140
19-0436	20-01457	C50/40	50	40	M10	10	112	3.3	40	0.170
19-0438	20-01025	C50/45	50	45	M10	10	107	4.1	40	0.169
19-0440	20-01313	C50/50	50	50	M10	10	107	4.9	40	0.182
19-0447	20-01318	C75/40	75	40	M12	12	296	3.2	70	0.396
19-0448	20-01541	C75/45	75	45	M12	12	280	3.5	70	0.423
19-0450	20-01320	C75/50	75	50	M12	12	265	4.1	70	0.445
19-0451	20-00125	C75/55	75	55	M12	12	245	4.6	70	0.478
19-0332	20-01324	C100/40	100	40	M16	16	663	2.9	170	0.794
19-0446	20-01325	C100/55	100	55	M16	16	520	4.9	170	0.933

Bobbin - Type E

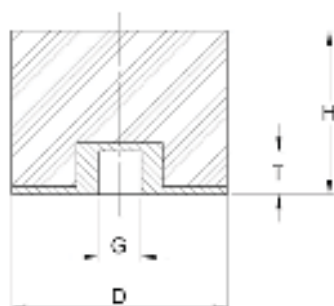
Figures stated are for natural rubber hardness 60° IRH.

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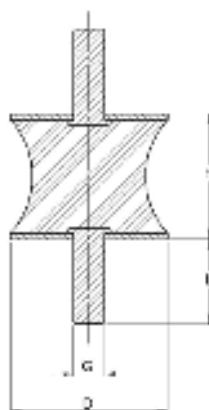


Technical Drawing

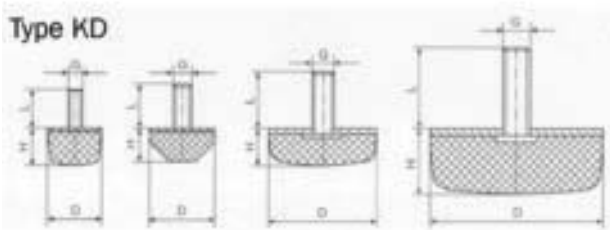
Type E



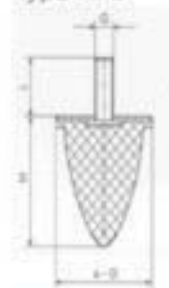
Type TA



Type KD



Type KPD



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					COMPRESSION		SHEAR		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			D	H	G	L	T	MAX LOAD (kg)	MAX DEFLECTION (mm)	MAX LOAD (kg)	MAX DEFLECTION (mm)		
19-0345	20-01564	E 15/15	15	15	M4	-	5	6	1	-	-	1.6	0.006
19-0347	20-00594	E 30/17	30	17	M8	-	8	45	1.7	-	-	20	0.010
19-0835	20-00668	E 40/30	40	30	M8	-	8	67	3.3	-	-	20	0.015
19-0349	20-01464	E 40/40	40	40	M8	-	10	61	4.6	-	-	20	0.020
19-0350	20-00501	E 50/20	50	20	M10	-	10	153	2	-	-	40	0.069
19-0456	20-00607	E 50/36	50	36	M10	-	10	120	3.5	-	-	40	0.097
19-0834	20-01406	E 50/40	50	40	M10	-	10	112	4.3	-	-	40	0.194
19-0457	20-01407	E 50/45	50	45	M10	-	11	107	5.1	-	-	40	0.138
19-0581	20-01610	TA 25/20	25	20	M6	12/18	-	31	1	12	2	8.3	0.050
19-0699	20-01647	TA 40/30	41	30	M8	20	-	45	1.7	17	3.9	20	0.083
15-4069	10-00087	KD 25/12	25	12	M6	16	-	31	0.8	-	-	8.3	0.016
15-3452	20-00013	KD 25/13	25	13	M6	16	-	30	0.8	-	-	8.3	0.010
19-0582	20-01611	KD 25/17	25	17	M6	18	-	29	2	-	-	8.3	0.017
19-0506	20-00595	KD 50/17	50	17	M10	28	-	155	2	-	-	40	0.070
19-0851	20-01469	KD 50/50	50	50	M8	23	-	107	5.1	-	-	20	0.102
19-0604	20-00686	KPD 30/30	30	30	M8	20	-	35	6	-	-	20	0.027
19-0507	20-00929	KPD 30/36	30	36	M8	20	-	35	7	-	-	20	0.034

Other dimensions on special demand with minimum quantity and/or order value.

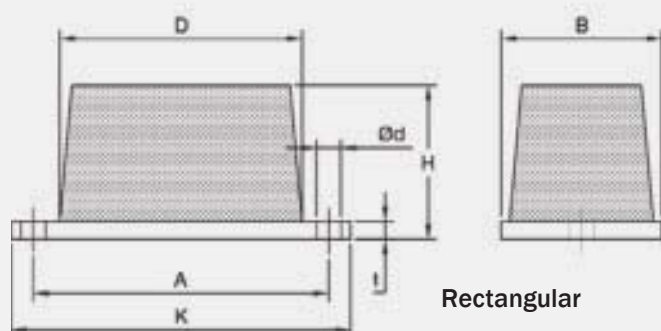
Buffers

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

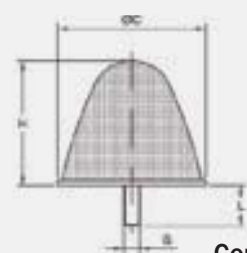
Circular and rectangular types are easily fitted.



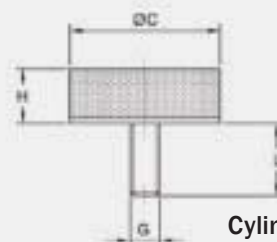
Technical Drawing



Rectangular



Conical



Cylindrical

Product Data

PART No.	TYPE	DIMENSIONS (mm)				MAX LOAD (kg)	MAX DEFLECTION (mm)	MAX BOLT TORQUE (mm)	WEIGHT (kg)
		C	H	G	L				
10-00341	CYLINDRICAL	21	19	M6	15	100	8	8.3	0.015
10-00342	CYLINDRICAL	32	20.6	M8	20	200	8	20	0.04
10-00337	CYLINDRICAL	50.8	19	M10	25	640	7	40	0.094
10-00340	CONICAL	28.6	37	M6	15	100	18	8.3	0.03
10-00339	CONICAL	38	38	M8	20	250	18	20	0.05
10-00334	CONICAL	48	51	M10	25	270	18	40	0.11
10-00338	CONICAL	70.3	46	M12	30	500	15	70	0.27
10-00336	CONICAL	108	93	M12	30	250	53	70	0.76
10-00335	CONICAL	108	119	M12	30	200	60	70	0.99

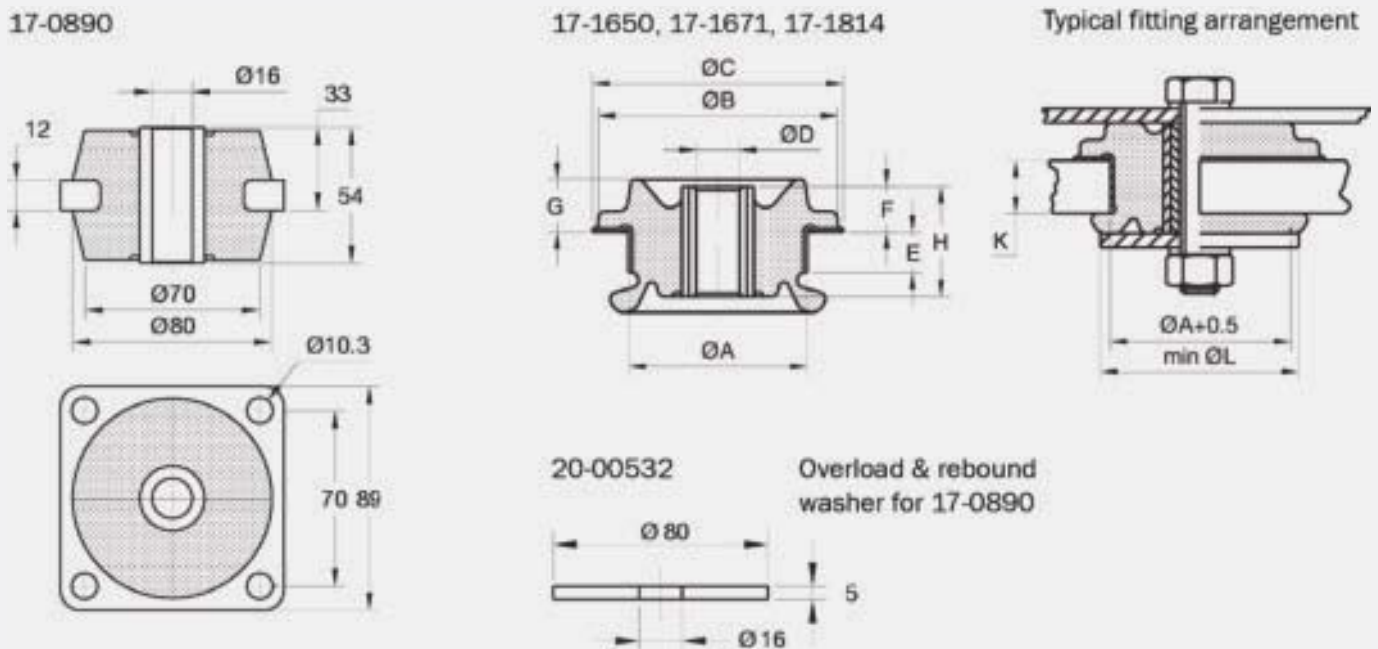
DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)							MAX LOAD (kg)	MAX DEFLECTION (mm)	WEIGHT (kg)
			K	A	B	H	D	d	t			
15-0437	10-00322	RECTANGULAR	55	120.5	47.5	6	8.7	104.8	86	1750	24	0.48
15-0238	10-00315	RECTANGULAR	55	120.5	57	6	8.7	104.8	86	4600	23	0.55
15-0260	10-00317	RECTANGULAR	36.5	155.5	63.5	6	13.5	127	89	1000	10	0.54
19-0564	20-00417	RECTANGULAR	22	84	32	3	6.7	68.5	51	815	7	0.85

Cab Mount

Specially profiled rubber section together with bump and rebound washers provide optimum suspension characteristics for cabs on commercial vehicles, tractors and other off-road vehicles.



Technical Drawing



Product Data

DRAWING No.	PART No.	DIMENSIONS (mm)										MAX LOAD (kg)	RADIAL STIFFNESS (N/mm)	WEIGHT (kg)
		A	B	C	D	H	F	E	G	K	L			
17-1671-1	10-00563	75	100	105	16.5	46	19	17	22	20	105	160	330	0.5
17-1650-1	10-00554	75	100	105	16.5	46	19	17	22	20	105	300	464	0.5
17-1650-1	10-00555	75	100	105	16.5	46	19	17	22	20	105	500	1200	0.5
17-1814	10-00598	89	115	120	25	47	13	23	21	25	120	410	1797	0.6
17-1814	10-00603	89	115	120	25	47	13	23	21	25	120	760	3314	0.6
17-0890	10-00440	SEE DRAWINGS										40	1027	0.8
17-0890	10-00441											60	1693	0.8
17-0890	10-00442											75	2000	0.8
Washer 18-0391C	20-00532											-	-	0.2

Chevron Springs

Metalastik® Chevron Springs are operating world wide in a diversity of service applications including LRV, Metro, Freight wagons, High Speed Passenger Coaches and Locomotives. Axlebox load capacities range from 16 kN to 120 kN and vertical deflections from 12 mm to 100 mm.

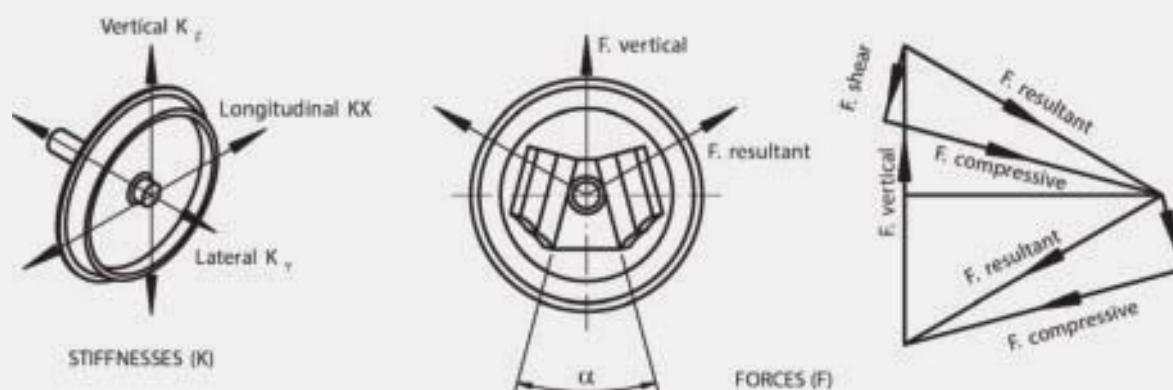
Chevron Springs provide three modes of flexibility for axlebox primary suspensions. The suspension properties are achieved by fitting the springs in a vee formation and with shear and compression compliance within the rubber elements. Improved ride characteristics are provided with the advantages of simplicity, long service life and low maintenance costs.

Abutting end plates can be produced in light alloy to match with similar material interfaces at the axlebox or vehicle frame.

The included angle of the chevron plates can be varied between 90 deg. and 140 deg. at the design stage thereby allowing stiffness characteristics to be optimized to suit bogie designers.



Spring Characteristics

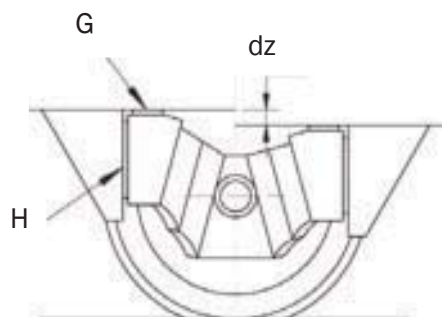


The three modes of flexibility for axlebox suspension are shown here. Springs are fitted inclined at an angle to the vertical axis, loading the rubber layers in shear and compression.

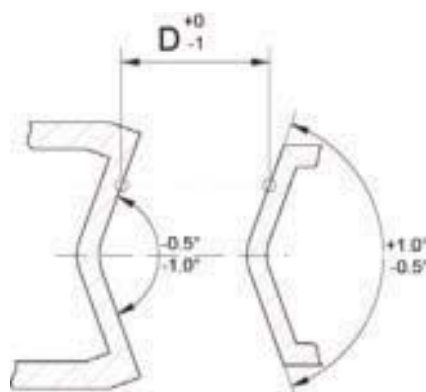
Values quoted for lateral and longitudinal stiffness may vary with vertical deflection. The longitudinal stiffness value applies when the elastic center of the two Chevron springs is at the journal center height. If the elastic center is above or below the center of the journal, the longitudinal stiffness at the journal will be less than the value quoted. Metalastik® Chevron springs may be fitted to two bearing or single self-aligning bearing axleboxes. For stability with self aligning bearings, the elastic center of the Chevron springs in their laden position should not be above the journal center height. The temperature at the axlebox faces adjoining the Chevron springs should not exceed 60 degrees C. A typical force diagram is shown above.

Chevron Springs Continued

Installation



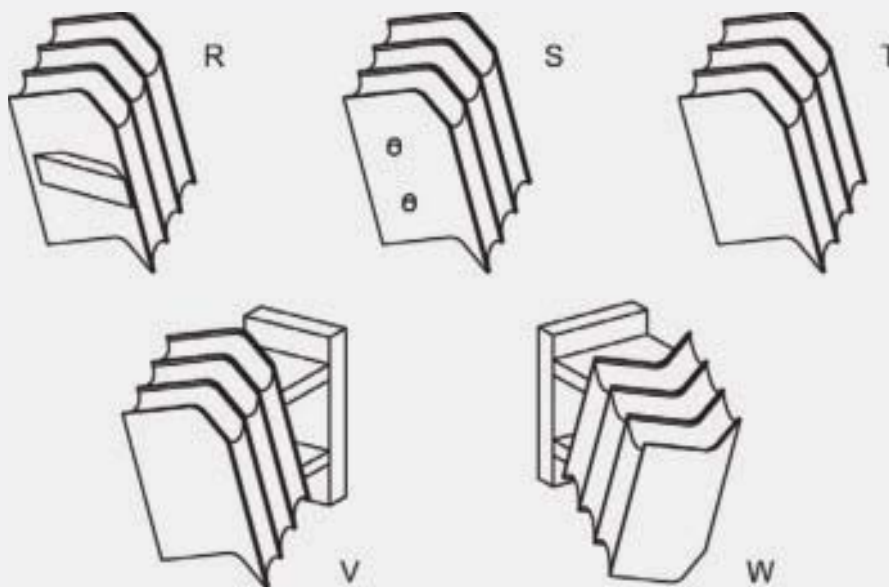
The vertical deflection (dz) may vary due to creep, Gough-Joule effect and stiffness tolerances. Shims (G) should be included for height adjustment. Shims (H) are sometimes necessary for accurate alignment of axes.



Tolerances

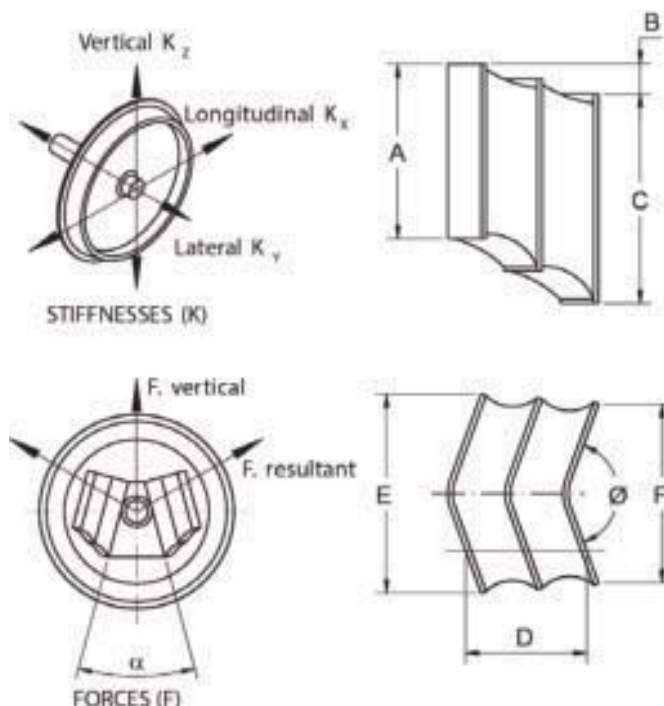
Tolerances at the adjoining faces should be as shown

Spring fixings



Springs can be supplied with alternative methods of location as shown in the diagram, namely with cross bar (R), dowel pins (S), or edge location (T). Location on the bogie frame is normally on the plate edge. Springs can be supplied with brackets for direct and easy fitting to the bogie frame (ref . figs V & W)

Chevron Springs Continued



Vertical deflection, load and all stiffnesses refer to two Chevron springs at one axlebox

90° Chevron Angle 11-25 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-1085	112	14.3	125	91	110	84	19	11	1.7	2.1	8	40	2.5
17-1084	152	14.3	165	91	110	84	24	11	2.1	4	11	40	3.4
17-1211	190	14.3	203	91	110	84	27	11	2.4	5	14	40	4.2
17-0424	127	29	152	88	126	76	19	19	1	1.1	3	40	3.6
17-1344	165	29	190	88	126	76	27	19	1.4	3.9	10	40	4.6
17-0375	200	32	216	113	209	121	35	25	1.4	2.5	6	40	7.6

Nominal load = Average load for passenger vehicles (crush load may be higher) and maximum load for freight vehicles

106° Chevron Angle 33-45 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2167	165	48	216	115	231	152	58	34	1.7	3.8	18	22	13.3
17-1083	197	48	248	115	231	152	82	34	2.4	7.2	33	22	15.4
17-1964	185	48	229	104	130	100	29	41	0.7	1.25	11	22	8.9
17-1593	227	48	270	130	265	175	94	41	2.3	10	46	22	17
17-1453	227	44	301	150	273	157	63	45	1.4	7.6	19	22	22.7
17-1153	203	64	273	150	252	152	90	45	2	7	32	22	21
17-1963	169	38	223	125	176	132	39	49	0.8	1.5	12	22	8.7
17-1760	188	29	282	150	252	152	53	59	0.9	4.2	10	22	19

Chevron Springs Continued

120° Chevron Angle 21-32 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (KG)
	A	B	C	D	E	F							
17-1610	181	23	210	64	159	116	35	21	1.7	3.5	25	22	4.6
17-1866	176	30	216	88	192	143	33	30	1.1	3.6	16	22	8.3
17-0888	138	30	178	88	192	143	39	30	1.3	3.1	25	22	8.2
17-0508	176	30	216	88	192	143	55	30	1.8	3.7	30	22	10.4
17-1747	200	50	213	95	120	115	26	32	0.8	0.7	0.9	22	5.5
17-1525	225	62	260	95	140	120	35	32	1.2	1.5	13	22	7
17-2085	225	50	255	93	150	145	47	36	1.3	3.2	16	24	8

120° Chevron Angle 35-40 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2023	260	60	269	110	136	120	31	38	0.8	1.9	5	24	11
17-1676	251	65	260	109	130	138	24	40	0.6	1	6	22	8
17-1371	146	40	197	115	203	143	32	40	0.8	3	10	22	8.7
17-0885	127	40	178	115	203	143	40	40	1	2	17	22	8.3
17-1727	169	38	223	116	181	132	40	40	1	1.5	20	22	8.6
17-1376	194	38	248	116	181	132	48	40	1.2	1.8	26	22	9.8
17-2057	262	68	262	147	201	117	56	43	1.3	3	11	30	12

120° Chevron Angle 40-56 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-1331	165	40	216	116	223	165	56	40	1.4	3	27	22	10.5
17-1467	200	40	255	116	223	165	56	40	1.4	4.6	24	22	13.5
17-1001	191	40	241	116	203	143	84	40	2.1	3.6	37	22	12.7
17-1574	178	57	241	149	202	116	31	51	0.6	1.8	7	22	11.1
17-1457	253	90	318	149	202	116	56	51	1.1	3	13	22	16
17-1151	178	57	241	149	202	116	61	51	1.2	1.6	23	22	11.8
17-1786	240	82	266	162	244	160	56	56	1	3.7	13	22	18.6

140° Chevron Angle 59-78 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2003	280	114	271	200	208	204	48	73	0.66	0.3	6	26	21
17-2185	280	114	271	203	208	204	38	74	0.52	0.5	4.7	26	21
17-1621	280	123	280	198	230	226	62	78	0.8	0.4	6.5	22	24.8

CLASSIFICATION

Springs listed on the following pages are classified in the following ranking order :

- 1) Chevron angle - 90o, 106o, 120o and 140o.
- 2) Listings in each of the above groups are then ranked progressively in terms of deflection capacity followed by load capacity.

Circular SAW Mounting

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

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

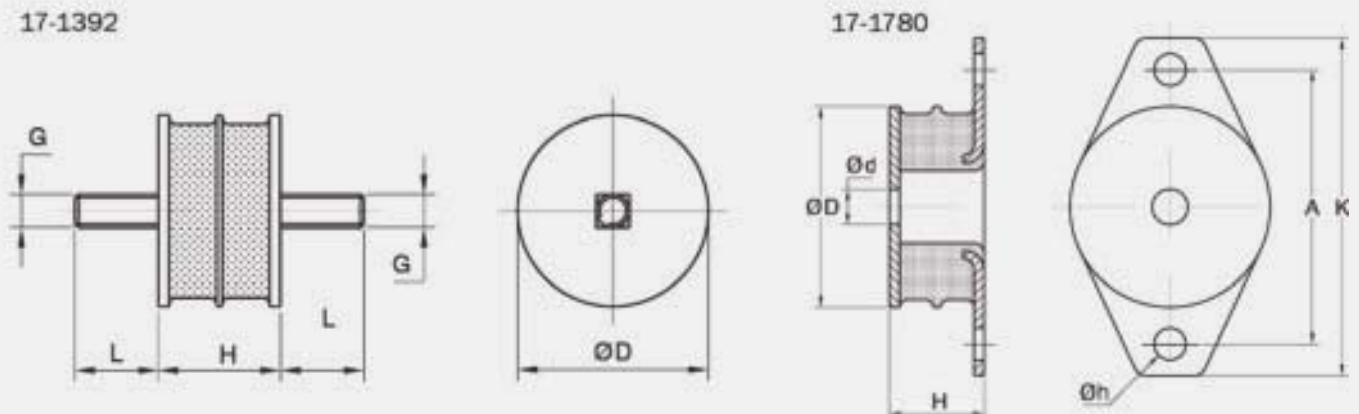
17-1780 can be fitted with a rebound washer for mobile applications.

Typical Applications Include:

- Vibratory rollers
- Small vibrating screens
- Small engines



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)		WEIGHT (kg)
			D	H	L	G	A	K	d	h	COMPRESSION	SHEAR	
17-1392	10-00492	45 IRH	57	37	25	M10	-	-	-	-	120	90	0.3
17-1392	10-00493	60 IRH									250	90	
17-1392	10-00494	70 IRH									330	90	
17-1780	20-02536	45 IRH	95	45	-	-	130	160	17	15	180	135	0.8
17-1780	20-02848	60 IRH									350	160	

Conical Bearing

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 also provide superior shock attenuation whilst providing good control in the radial and axial directions.

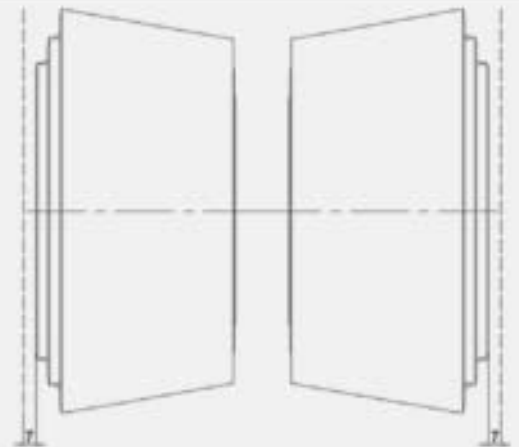
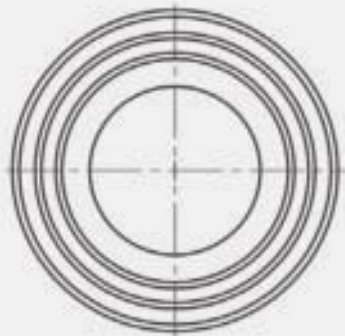
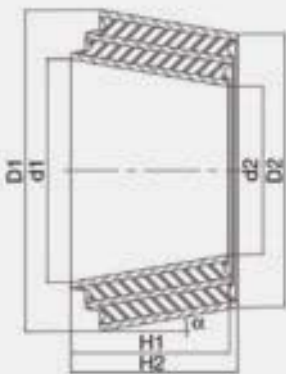
Conical bearings are used usually in pairs to transfer radial and axial loads whilst allowing large torsional movement and some conical. These are therefore suitable in applications where controlled flexibility is required such as in large travel suspension systems.

The high accuracy components provide

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



Technical Drawing



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

Product Data

DRAWING No.	PART No.	DIMENSIONS (mm)							RADIAL MAX LOAD PER PAIR (kN)	WEIGHT (kg)
		D1	d1	D2	d2	H1	H2	α		
23-1064	10-01401	215.5	149	194.5	120.5	80	80	9	60	4.86
13-4473	10-02146	250	170.5	214.7	130	116	120	10	80	10
23-1070	10-01678	230	159	196.2	120	112	19.5	10	125	7.9

Cushyfloat® Mounting

The Cushyfloat® mounting is a general purpose unit designed to provide effective isolation of vibration and noise arising from both static and mobile equipment.

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

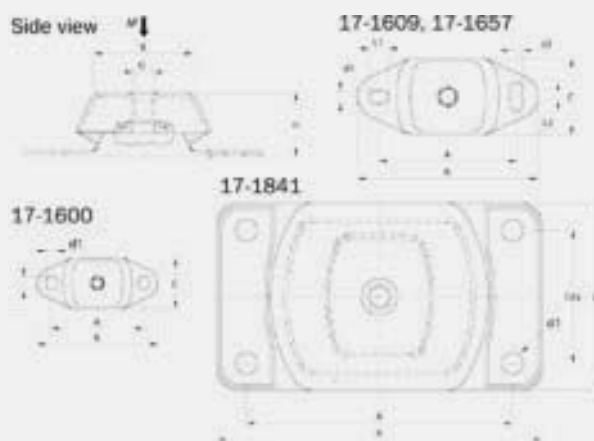
The design incorporates bump and rebound control features which limit excessive movements under shock loading. Top metal cover gives protection against oil contamination and protective finish resists corrosion attack. Propeller thrust on marine applications is accommodated. There are four sizes in the standard range with varying degrees of rubber hardness catering for point loads from 32kg to 3000kg. Natural frequencies as low as 8Hz are possible.

Typical Applications Include:

- Marine/industrial vehicle engines
- Portable gensets and pumps
- Generator sets
- Pumps and compressors



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)										MAX LOAD (kg)		MAX THRUST LOAD (N)	WEIGHT (kg)
			B	C	A	K	H	d1	L1	d2	L2	G	VERTICAL	VERTICAL WITH THRUST		
17-1600	10-00535	45 IRH	62	60	100	120	38-40.5	11	14	11	14	M12	50	35	370	0.36
	10-00536	55 IRH	62	60	100	120	38-40.5	11	14	11	14	M12	65	55	560	0.36
	10-00537	65 IRH	62	60	100	120	38-40.5	11	14	11	14	M12	100	80	830	0.36
17-1609	10-00545	45 IRH	76	75	140	183	49	13	20	13	30	M16	150	95	1000	0.86
	10-00546	55 IRH	76	75	140	183	49	13	20	13	30	M16	210	140	1500	0.86
	10-00547	65 IRH	76	75	140	183	49	13	20	13	30	M16	300	210	2300	0.86
	10-00548	75 IRH	76	75	140	183	49	13	20	13	30	M16	450	315	3300	0.86
17-1657	10-00557	45 IRH	72	112.5	182	228	70	18	26	18	34	M20	300	250	2800	2.25
	10-00558	55 IRH	72	112.5	182	228	70	18	26	18	34	M20	520	370	4200	2.25
	10-00559	65 IRH	72	112.5	182	228	70	18	26	18	34	M20	800	560	6400	2.25
	10-00560	75 IRH	72	112.5	182	228	70	18	26	18	34	M20	1000	700	11800	2.25
17-1841	10-00605	40 IRH	120	190	270	330	112	22	-	-	-	M24	950	630	5300	9.6
	10-00606	50 IRH	120	190	270	330	112	22	-	-	-	M24	1400	945	7100	9.6
	10-00607	60 IRH	120	190	270	330	112	22	-	-	-	M24	2200	1575	12500	9.6
	10-00608	70 IRH	120	190	270	330	112	22	-	-	-	M24	3000	2100	18000	9.6

Cushyfloat® HT Mounting

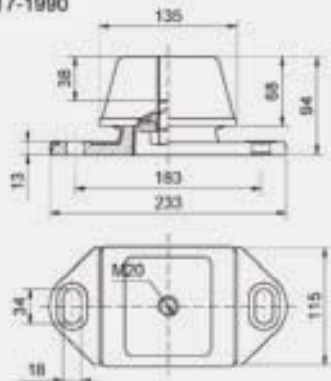
The Cushyfloat® HT (High Thrust) Mounting has been developed to meet the increased torque output and higher thrust load requirements of many modern marine power units. By careful design of the rubber section, relatively high degrees of flexibility in the vertical and lateral modes are combined with high stiffness in the longitudinal fore and aft direction, thereby affording good vibration isolation properties and minimum movement under thrust forces.

The design incorporates bump and rebound control features which limit excessive movements under shock loading. The mountings have a high inbuilt tensile strength which renders them very suitable for the suspension of power units in lifeboat applications.

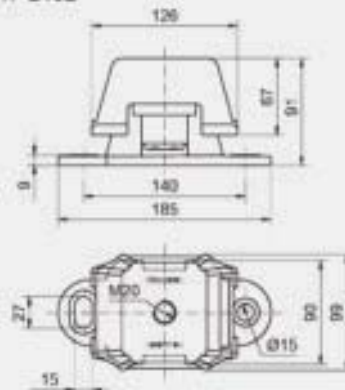


The top metal cover gives protection against oil contamination and the protective finish resists corrosion attack. Two basic designs and different rubber compounds allow loads between 85 and 1070 kg to be accommodated.

7-1990 17-1990



17-2182 17-2182



All dimensions in mm

Product Data

DRAWING No.	PRODUCT No.	TYPE	MINIMUM VERTICAL LOAD (kg)	MAX VERTICAL LOAD (kg)	STATIC STIFFNESS (kN/mm)	DYNAMIC STIFFNESS (kN/mm)	MINIMUM COMPRESSION (mm)	MAX COMPRESSION (mm)	WEIGHT (kg)
17-2182-1	10-01143	35 IRH	85	140	0.4	0.42	3	5	3.4
17-2182-1	10-01144	45 IRH	125	209	0.57	0.66	3	5	3.4
17-2182-1	10-03014	55 IRH	204	339	0.96	1.2	3	5	3.4
17-2182-1	10-02930	65 IRH	301	499	1.53	2.06	3	5	3.4
17-1990-1	10-01150	45 IRH	150	571	1.6	1.85	1	4	6.2
17-1990-1	10-03146	60 IRH	296	1070	3	3.9	1	4	6.2

Nominal stiffness ratios

DRAWING No.	VERTICAL	LATERAL	LONGITUDINAL
17-1990	1	0.25	9
17-2182	1	0.85	6

N.B. Stiffness values quoted refer to tangent stiffness at 5 mm static deflection for 17-2182 and at 4 mm for 17-1990 and are for guidance purposes only.

Cushyfloat® HD

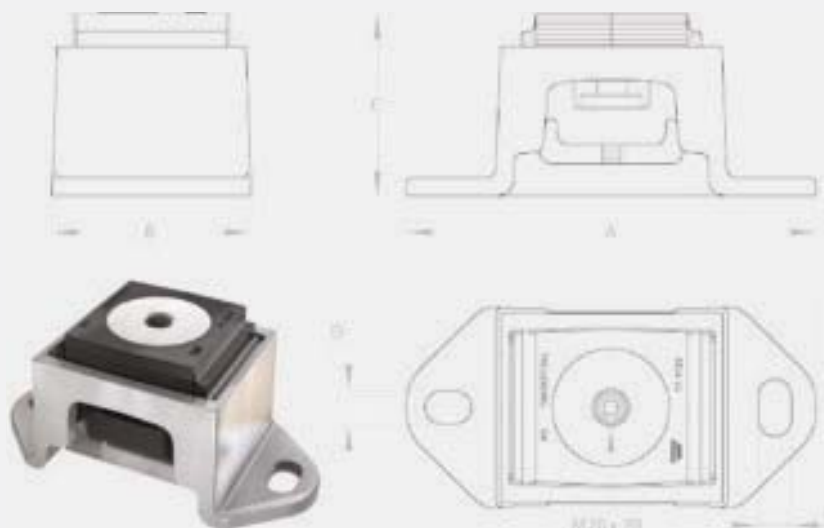
The latest generation of Metalastik® Cushyfloat® is a completely new and innovative design which offers engine manufacturers and boat builders maximum versatility. This product has multiple performance benefits for customers whose requirements may be varied and challenging for conventional solutions.

The HD Cushyfloat® has excellent performance characteristics with:

- Up to 10mm linear vertical deflection, with low horizontal stiffnesses. This enables improved vibration isolation - even at the low end of the engine speed range.
 - Vertical and lateral buffering within the design limits the movement of the engine in tough service conditions.
 - The entire range can be formulated from just three rubber mixes; therefore reducing inventory requirements and the complexity of product selection.
 - Installation is aided by sighting grooves so that it is easy to align the engine, and ensure the correct load distribution.
 - More cost effective product life and serviceability due to its modular design. Upon refurbishment, the outer casting can be re-used.
- The HD Cushyfloat® provides simplicity for engines manufacturers and end users with:
- An interchangeable footprint with existing mountings; minimizing retrofit installation issues.



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					MAX LOAD (kg)	MAX LOAD WITH THRUST (kg)	MAX THRUST (kN)		STATIC STIFFNESS (N/mm)	MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			A	B	C	D	E			CONTINUOUS	INTERMITTENT			
17-4726-1	10-02308	40 IRH						220	155	2.45	3.19	270	170	5
17-4726-1	10-02108	50 IRH	228	111	101	18	18	320	220	3.67	4.78	390	170	5
17-4726-1	10-02109	60 IRH						470	330	5.51	7.16	575	170	5
17-4792-1	10-02159	40 IRH						530	370	5.33	6.93	650	170	5.15
17-4792-1	10-02114	50 IRH	228	111	101	18	18	735	515	7.96	10.35	900	170	5.15
17-4792-1	10-02160	60 IRH						980	685	14.7	19.11	1200	170	5.15

Mini HD Cushyfloat®

Trelleborg Mini HD Cushyfloat® mounts combine 3 way control of suspended equipment with large static deflections where the rubber is loaded in shear and compression. The design incorporates bump and rebound control features which limit excessive movement under shock loading.

The easy to install mounting features a prominent use of lightweight engineered plastics which offer greater environmental protection with no compromise in product performance.

The achievable benefits of the Mini HD Cushyfloat® have been identified as:

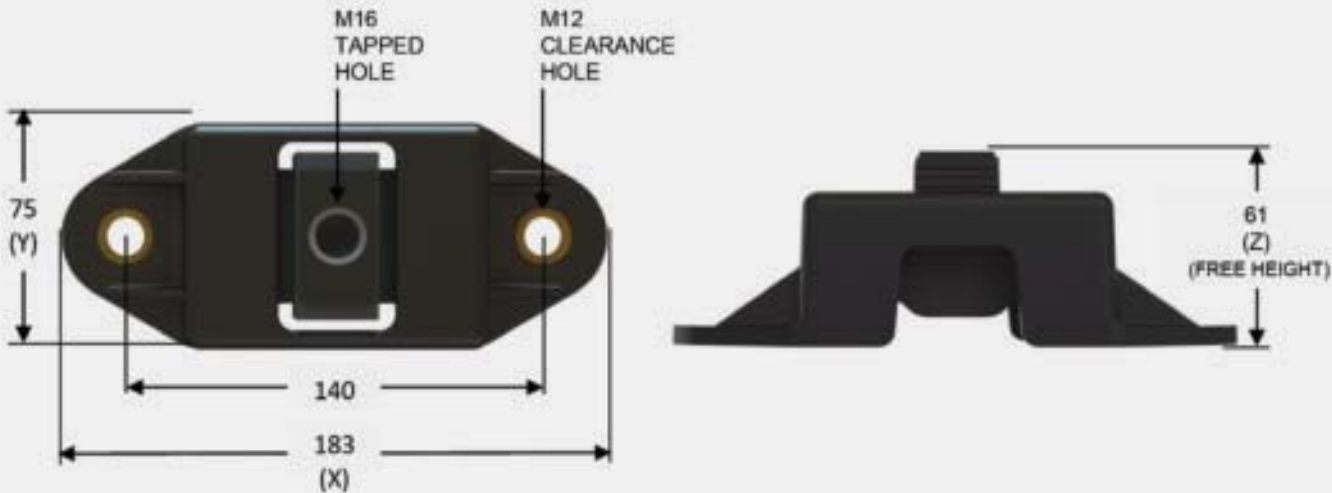
- Large linear vertical deflection.
- Similar stiffness ratios to same footprint part (17/1609).
- Corrosion resistant materials.
- Lightweight part (0.45kg).
- Modular and failsafe design.
- Wide loading capability



Typical Applications Include:

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

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	MAX LOAD (kg)	MAX LOAD WITH THRUST (kg)	STATIC STIFFNESS (kN)	AXIS STIFFNESS RATIO			MAX THRUST (N)		MOX BOLT TORQUE (Nm)	WEIGHT (kg)
						Z	Y	X	CONTINUOUS	INTERMITTENT		
17-4944-1	10-02322	50 IRH	100	91	130	1	0.3	2.5	1100	1650	60	0.45
17-4944-1	10-02036	60 IRH	160	112	210	1	0.3	3	1650	2450	60	0.45
17-4944-1	10-02037	70 IRH	220	154	280	1	0.3	3.4	2450	3675	60	0.45

Cushyfoot® Mounting

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

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

The Cushyfoot mounting benefits from the following features:

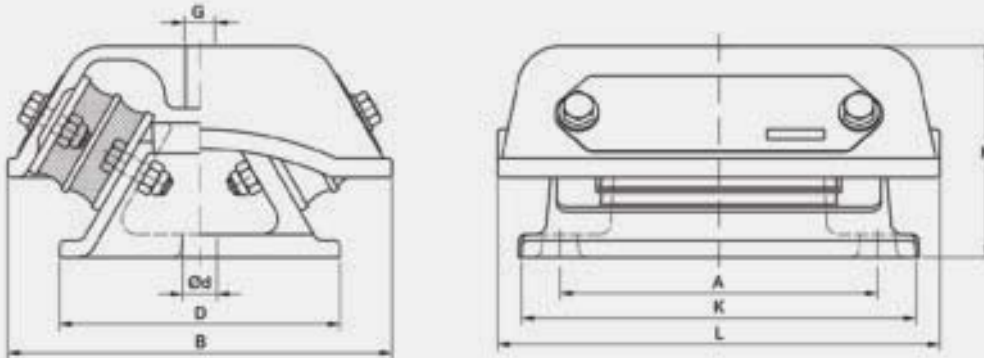
- A wide load range from 50 to 1280 kg
- Clear branding for product identification
- Strong casting for safety and reliability
- Dissimilar horizontal stiffness gives optimum isolation and motion control



Typical applications Include:

- Diesel engines
- Generator sets
- Compressors
- Fans
- Hydraulic units
- Lift machinery

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)	WEIGHT (kg)
			L	B	A	K	H	D	d	G		
17/0290	20-00689	45 IRH	122	132	90	114	72	82	13	M16	120	23
17/0290	10-04251	60 IRH									230	23
17/0213	10-04106	45 IRH	230	204	165	205	110	148	18	M16	590	10
17/0213	20-00688	60 IRH									1250	10
17/0346	10-04123	45 IRH	230	204	165	205	123	148	18	M16	630	9.5
17/0346	10-04120	60 IRH									1280	9.5

Cushymount®

The Cushymount® provides large deflections with high load capacity and long service life and incorporates an integral adjustable buffer, which limits horizontal and vertical movements of the suspended equipment under shock loading without the need for external devices (i.e. links or buffers).

The mounting assembly consists of four bonded rubber to metal circular springs loaded in shear and compression to give optimum load-deflection properties in both vertical and horizontal directions.

The rubber spring elements are protected from physical damage and oil/fluid contamination by the robust S.G. iron castings in which they are housed.

A wide range of load/deflection requirements is covered by a single-sized unit using three types of spring in rubber compounds of varying stiffnesses.

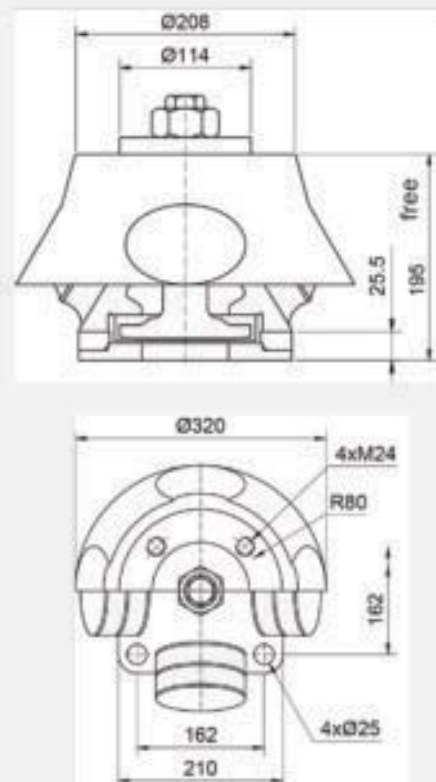
Typical applications include:

- Medium speed diesel engines
- Marine propulsion engines
- Marine auxiliaries

The Cushymount® is also used for isolating vibration and noise from winches and other heavy machinery, and for insulating deck houses on board ship from vibration and noise.



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	MAX LOAD (kN)	STATIC VERTICAL STIFFNESS (N/mm)	DYNAMIC VERTICAL STIFFNESS (N/mm)	MAX BOLT TORQUE (kN)	WEIGHT (kg)
17/1468	10-04802	45 IRH	10.5	590	700	270	37
17/1468	10-04803	55 IRH	15.7	880	1160	270	37
17/1469	10-03439	55 IRH	27.5	1680	2060	270	37
17/1470	10-00507	45 IRH	36.8	2450	2850	270	37
17/1470	10-03106	55 IRH	55	3530	4400	270	37
17/1470	10-02989	65 IRH	70.5	5200	7000	270	37

D-Series

Metalastik® D Series Mountings are suitable for the suspension of heavy equipment or machinery where insulation against low frequency vibration is required with the additional benefit of excellent high frequency acoustic attenuation.

The relatively large rubber volume ensures high degrees of insulation against low frequency disturbing vibrations.

Differing stiffness rates in the two horizontal modes enables suspension characteristics to be optimized by appropriate orientation of the mountings.

The mountings can be used in conjunction with additional bonded rubber buffers to limit movement of the suspended equipment under shock loading.

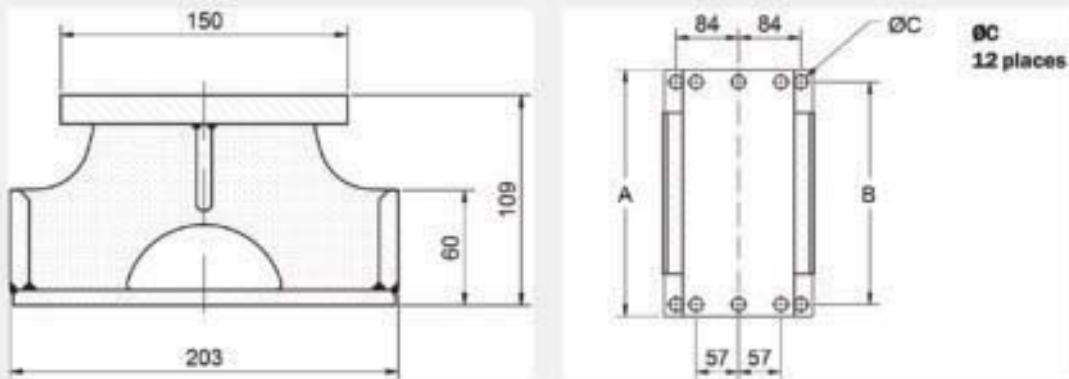
Parts can be supplied to meet naval specification requirements and also with plain flanges for drilling by the customer.



Typical applications include :

- Medium speed marine propulsion engines
- Generator sets
- Gearboxes
- Pumps
- Compressors and refrigeration systems

Technical Drawing



Product Data

DRAWING No.	TYPE	DIMENSIONS (mm)			MAXIMUM LOAD (kN)	STATIC VERTICAL STIFFNESS (N/mm)	DYNAMIC VERTICAL STIFFNESS (N/mm)	WEIGHT (kg)
		A	B	C				
17/1603	45 IRH	210	178	9	6.6	420	478	9
17/1603	55 IRH				9.5	630	785	9
17/1603	65 IRH				14.2	920	1240	9
17/1602	45 IRH	267	235	12	12.75	805	912	12
17/1602	55 IRH				19	1200	1500	12
17/1602	65 IRH				27.5	1710	2295	12
17/1601	45 IRH	330	298	18	14.2	880	1003	15
17/1601	55 IRH				21	1300	1625	15
17/1601	65 IRH				31.4	2000	2700	15

DX Mount

DX Mountings compliment the D Series and Super D mounting range to offer an increased static and shock deflection capacity. Typical applications includes heavy marine/Naval applications, where high load capacity is required along with high vibration and shock attenuation.

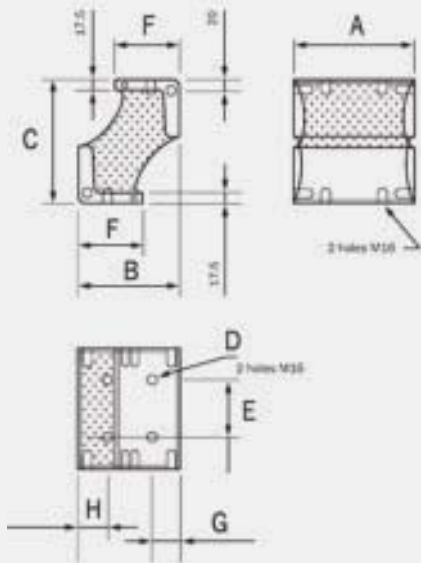
The increased shock capacity allows the potential use of commercially off the shelf products (COTS) in naval applications.

The mount is of a modular design and is based around a 17/2196 bonded unit. Alternatively they can be assembled as pairs (Double DX) or quad (Quad DX) to offer higher load carrying capacity.

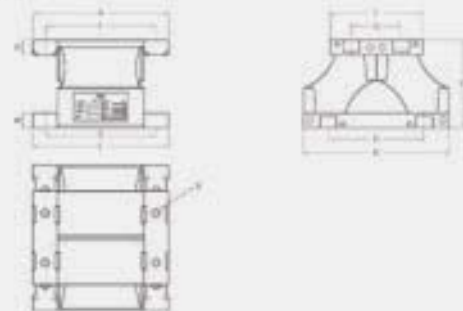


Technical Drawing

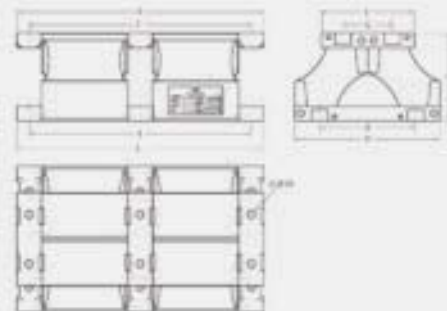
SINGLE DX



DOUBLE DX



QUAD DX



Product Data

DRAWING No.	ARRANGEMENT	TYPE	DIMENSIONS (mm)								MAX LOAD (kN)	VERTICAL STIFFNESS (kN/mm)	WEIGHT (kg)
			A	B	C	D	E	F	G	H			
17-2196	SINGLE DX	50 IRH	210	177	211	M16	100	113	50	50	10	0.32	17
17-2196	SINGLE DX	60 IRH	210	177	211	M16	100	113	50	50	15	0.50	17
17-2196	SINGLE DX	70 IRH	210	177	211	M16	100	113	50	50	22	0.75	17
17-2266	DOUBLE DX	50 IRH	330	353	211	18	270	226	120	230	20	0.64	50
17-2266	DOUBLE DX	60 IRH	330	353	211	18	270	226	120	230	30	1.00	50
17-2266	DOUBLE DX	70 IRH	330	353	211	18	270	226	120	230	45	1.50	50
17-2267	QUAD DX	50 IRH	600	353	211	18	540	226	120	230	40	1.28	94
17-2267	QUAD DX	60 IRH	600	353	211	18	540	226	120	230	60	2.00	94
17-2267	QUAD DX	70 IRH	600	353	211	18	540	226	120	230	90	3.00	94

EH Mount

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, 40 to 1200 kg

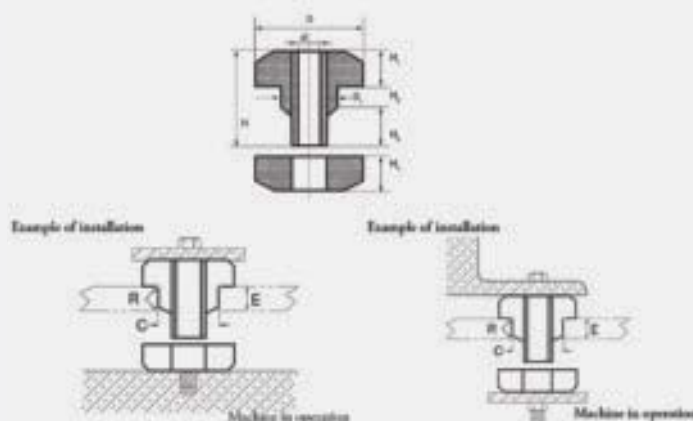
Type EH mountings are designed to achieve effective vibration isolation on engines, operator cabins and other ancillary units.

Typical applications include:

- Off-highway vehicles
- Military vehicles
- Construction equipment
- Material handling vehicles
- Agriculture vehicle



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)												MAX LOAD (kg)	BOLT SIZE	MAX BOLT TORQUE (Nm)	WASHER PART No.	WEIGHT (kg)
			d	D	D	H	H1	H2	H3	H4	C	E	R						
55-1070-1	20-02900	EH 40	10	33	20	32	12	6.5	13	12	19	10	1	40	M10	25	20-02816	0.033	
55-1070-1	20-02901	EH 60	10	33	20	32	12	6.5	13	12	19	10	1	90	M10	25		0.033	
19-0213-1	20-00621	EH 4850-40	13	50	32	50	20	10	20	20	31	15	1.5	60	M12	40	20-00416	0.12	
19-0213-1	20-00620	EH 4850-60	13	50	32	50	20	10	20	20	31	15	1.5	100	M12	40		0.12	
19-0214-1	20-00619	EH 6463-40	17	64	40	62	23	14	25	23	39	22	2.3	90	M16	80	20-01495	0.23	
19-0214-1	20-00618	EH 6463-60	17	64	40	62	23	14	25	23	39	22	2.3	200	M16	80		0.23	
19-0727-1	20-00617	EH 9075-40	23	89	58	73	25	19	29	25	56.5	28	3	200	M22	200	20-00533	0.53	
19-0727-1	20-00616	EH 9075-60	23	89	58	73	25	19	29	25	56.5	28	3	350	M22	200		0.53	
13-4109-1	20-02558	EH 1127-40	37.8	124	64.8	85.9	31.8	22.3	31.8	31.8	63	32	4	550	M24	300	CONTACT FOR DETAILS	1.11	
13-4109-1	20-02899	EH 1127-60	37.8	124	64.8	85.9	31.8	22.3	31.8	31.8	63	32	4	1200	M24	300		1.11	

Equi-frequency Mounting - Small



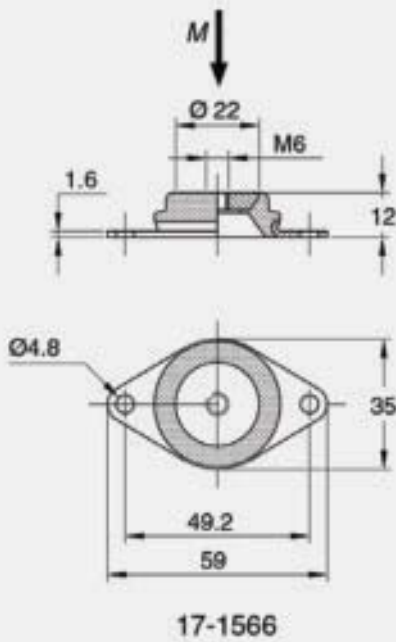
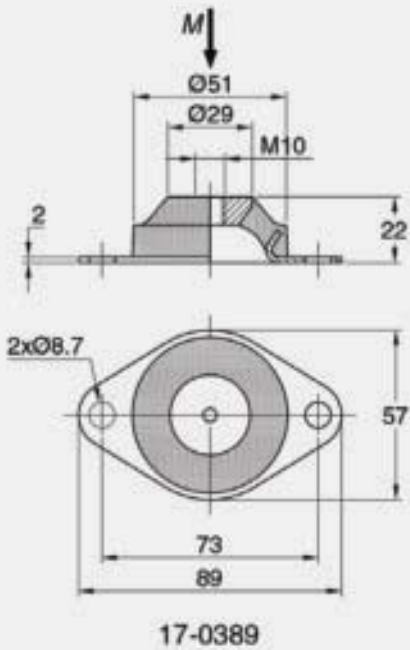
General purpose low-profile mounting for use where space is restricted. Suitable for stationary applications. May also be used to protect delicate or sensitive equipment from shock or disturbances.

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

Typical Applications

- Instrumental panels
- Small fan sets
- Small vacuum pumps
- Small reciprocating engines

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	MAX LOAD (kg)	STIFFNESS (N/mm)	WEIGHT (kg)
17-1566	10-00529	45 IRH	11	75	0.024
17-1566	10-00530	60 IRH	22	130	0.024
17-0389	10-00406	45 IRH	27	100	0.1
17-0389	10-00407	60 IRH	54	180	0.1

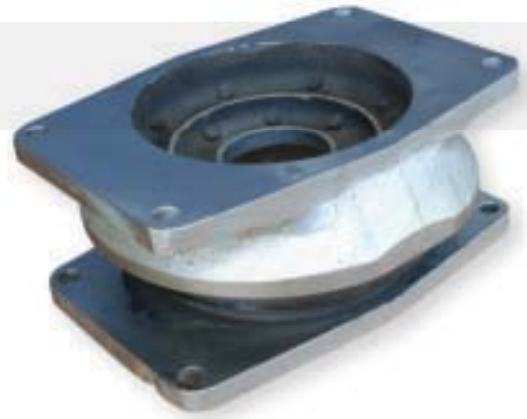
Equi-frequency Mounting - Large

In common with the range of smaller Equi-Frequency mountings, these heavy duty parts have substantially the same stiffness in all directions.

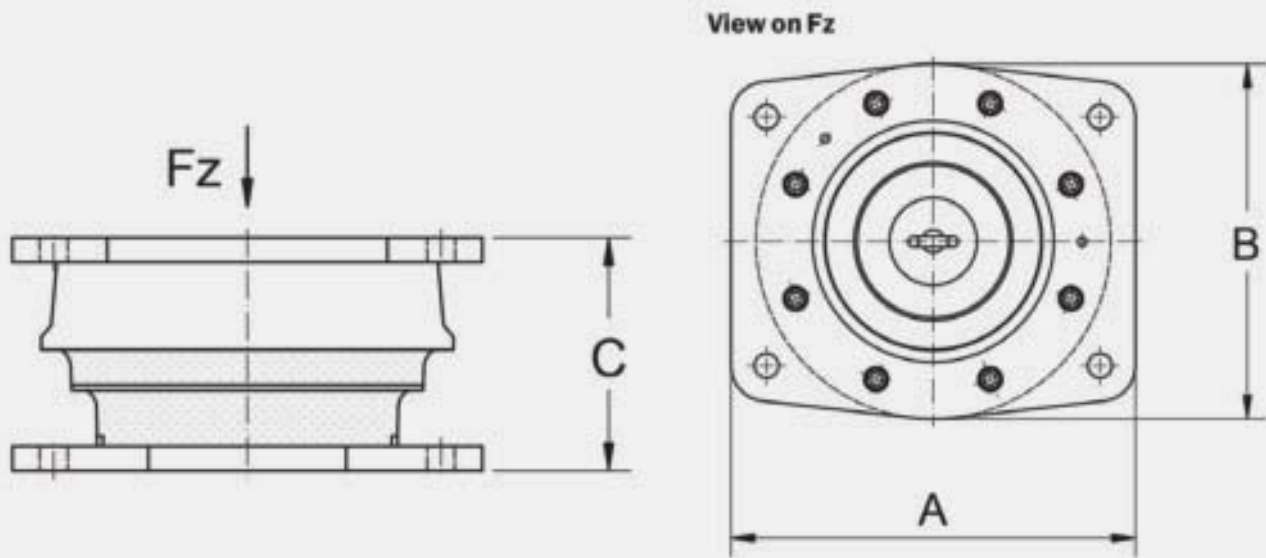
With two sizes of mounts produced in two rubber compounds it is possible to support static loads from 40 to 215kN. Parts are available with ferrous and non magnetic metal parts. Rubber sections are protected with an MOD approved protective lacquer to reduce oil and ozone attack

Equi-Frequency mountings are designed to meet the shock requirements of MAP 01-470 (UK MOD)

This range of mountings was designed to support and isolate Marine propulsion engines, Generator sets, Gas Turbine engines, Reactors and Machinery Rafts



Technical Drawing



Product Data

DRAWING No.	TYPE	DIMENSIONS (mm)			MAX LOAD (kN)	STATIC STIFFNESS (kN/mm)	DYNAMIC STIFFNESS (kN/mm)	WEIGHT (kg)
		A	B	C				
17-1472	45 IRH	346	305	152	40	2.45	2.82	31
17-1472	60 IRH	346	305	152	74	4.6	6	31
17-1544	45 IRH	570	500	283	115	8	9.3	192
17-1544	60 IRH	570	500	283	215	14.2	18.5	192

Flanged Instrumounting

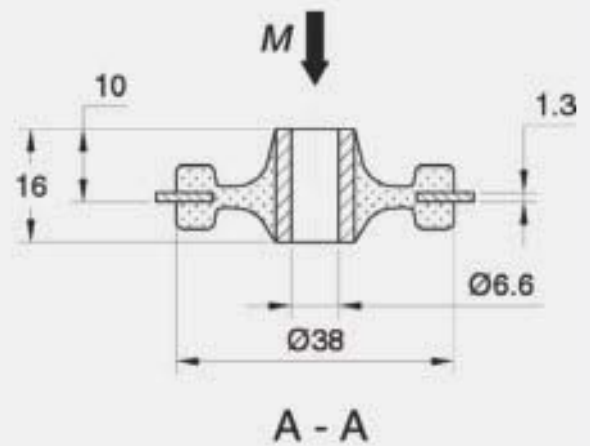
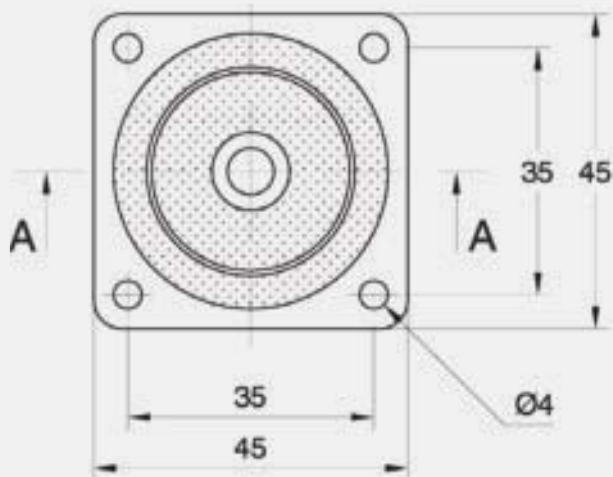
These mountings are suitable for both mobile and static applications, for the protection of sensitive equipment from external vibration or for vibration isolation. Flanged instrumountings can be fail-safe if fitted with a washer to the top and bottom of the rubber section.



Typical Applications

- Small fan sets
- Transformers
- Sensitive equipment

Technical Drawing



Product Data

DRAWING No.	PART NO.	TYPE	MAX LOAD (kg)	WEIGHT (kg)
17-1801	10-00583	45 IRH	2.7	0.03
17-1801	10-00584	60 IRH	5.4	0.03
17-4573	10-04819	45 IRH	75	1.03
17/4573	10-04820	60 IRH	150	1.03

Fluid Mount

The Fluid Mount has been designed for superior damping, shock and vibration control.

The design consists of a bonded rubber and steel mount with integral buffers to limit movement. Internal chambers contain a high damping fluid to provide damping of low frequency vibrations due to dynamic shock inputs to the vehicle.

This means the Fluid Mount is particularly suitable for the cabs on off-highway vehicles working in rough conditions.

The Fluid Mount combines the benefits of three main features; 1st it's a load bearing spring with restrained motion capability, 2nd the high damping provides decreased motion near resonance frequencies and 3rd it's an isolator providing vibration isolation at a specified frequency.

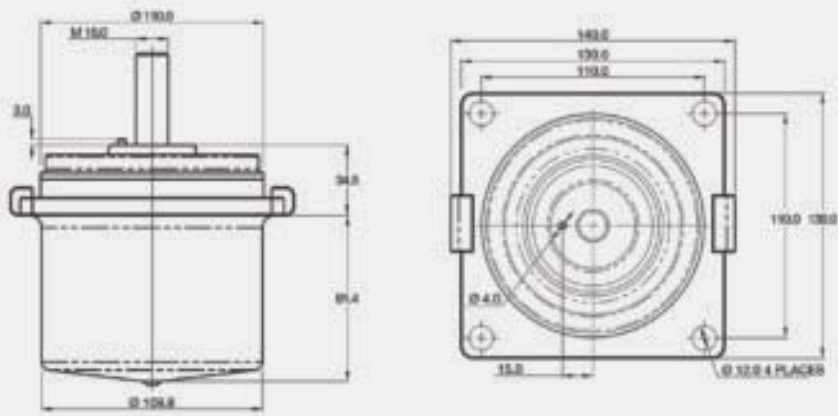
The Fluid Mount is available in three different bolt configuration; 45 mm or 75 mm threaded M16 stud or 30 mm deep M16 hole.



Typical Applications Include:

- Tracked & Wheeled Excavators
- Front End Loaders
- Backhoes
- Forestry Equipment

Technical Drawing



Product Data

DRAWING No.	PART No.	MIN LOAD (kg)	MAX LOAD (kg)	THREAD TYPE		MAX BOLT TORQUE (Nm)	WEIGHT (kg)
				LENGTH (mm)	FITMENT		
19-0246-1	20-01105	50	150	45	M16 STUD	260	4
19-0246-2	20-01496	50	150	90	M16 STUD	260	4.1
19-0246-3	20-01497	50	150	30	M16 HOLE	260	3.9
19-0246-1	20-01498	100	200	45	M16 STUD	260	4
19-0246-2	20-01499	100	200	90	M16 STUD	260	4.1
19-0246-3	20-01500	100	200	30	M16 HOLE	260	3.9
19-0246-1	20-01104	150	225	45	M16 STUD	260	4
19-0246-2	20-01501	150	225	90	M16 STUD	260	4.1
19-0246-3	20-01502	150	225	30	M16 HOLE	260	3.9

GK Mount

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

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

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

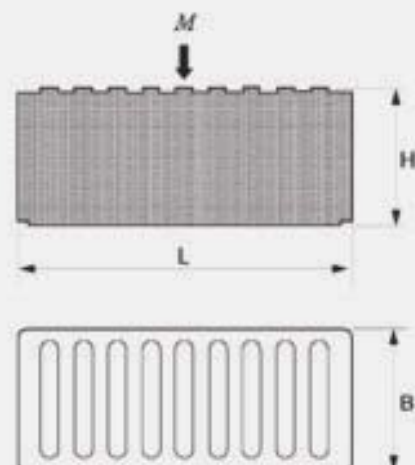
Installation is simple, eliminating traditional methods of attachment to machinery or support structure.

Typical Applications Include:

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



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)			MAX LOAD M (kg)	WEIGHT (kg)
			L	B	H		
15-4041	10-00085	GK0-40	195	175	150	1800	5.2
15-4041	10-00101	GK0-60	195	175	150	3800	5.7
15-4042	10-00008	GK1-40	400	175	150	4000	10.7
15-4042	10-00009	GK1-60	400	175	150	8000	11.8

Height Adjusters

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

Type HA is a height adjuster made in corrosion protected grade 8 steel. The steel is zinc plated and chromated according to DIN 50961/ISO 2081. The height adjuster is supplied complete with washer and nut for fastening to the mounting and two nuts and a lock washer for the engine foot fastening. The HA height adjustment facilitates precise coupling alignment for engine installations and boat building tolerances.

For optimum solutions where close coupling tolerances are required, allow the mountings to settle for 48 hours before final alignment of the engine installation.

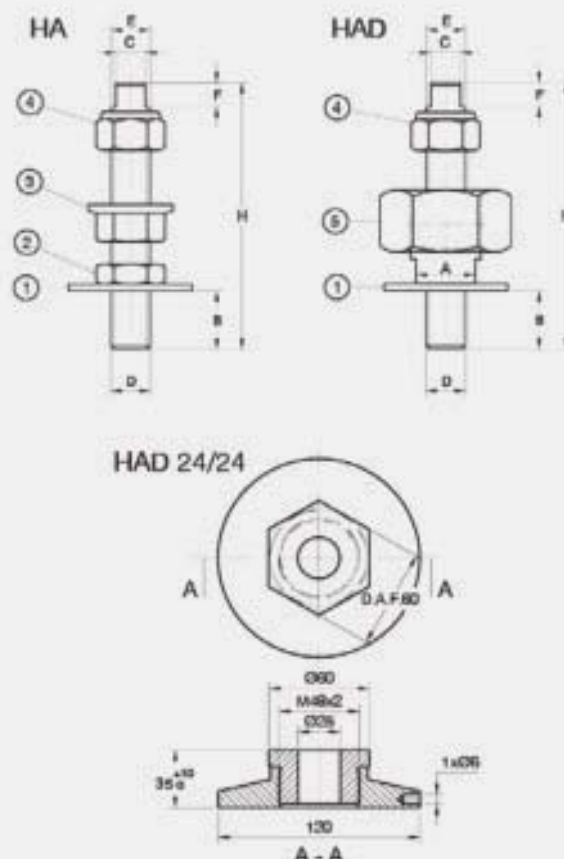
For securing the bolt into the mounting, it is recommended to apply thread lock adhesive.

Notes: For all applications with Thrust loads HAD type height adjusters must be used. On request, Trelleborg Industrial AVS application engineers can make the necessary calculations for the Anti Vibration and Shock Systems using Vibration Software. For optimum solutions where close coupling tolerances are required, allow the mountings to settle for 48 hours before final alignment of the engine installation.

For securing the bolt into the mounting, it is recommended Loctite be applied.



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)							WASHER (1)	HEXAGON LOW NUT (2)	HEXAGON FLANGE NUT (3)	LOCK NUT PLASTIC INSERT (4)	FINE THREAD ADJUSTING UNIT (5)
			H	D	E	A	B	C	F					
18-2210A	40-04704	HA 12/12	95	M12	M12	-	20	D.A.F.8	8	37*12*3	M12	M12	M12	-
38-1600H	40-06068	HA 12/16	105	M12	M16	-	20	D.A.F.12	10	44*15*3	M16	M16	M16	-
18-04705	40-04705	HA 16/16	110	M16	M16	-	24	D.A.F.12	10	50*15*3	M16	M16	M16	-
18-2210D	20-00511	HA 16/20	130	M16	M20	-	24	D.A.F.12	10	56*20*4	M20	M20	M20	-
18-2210E	40-02515	HA 20/20	135	M20	M20	-	30	D.A.F.12	10	60*21*4	M20	M20	M20	-
18-2210F	20-00513	HAD 12/16	105	M12	M16	D.A.F.24	20	D.A.F.12	10	44*15*3	-	-	M16	M30*1.5
18-2210G	20-00514	HAD 16/16	110	M16	M16	D.A.F.24	24	D.A.F.12	10	50*15*3	-	-	M16	M30*1.5
18-2210H	20-00515	HAD 16/20	130	M16	M20	D.A.F.27	24	D.A.F.12	10	56*20*4	-	-	M20	M36*2
18-2210J	20-00516	HAD 20/20	135	M20	M20	D.A.F.27	30	D.A.F.12	10	60*21*4	-	-	M20	M36*2
18-2210K	20-00517	HAD 24/24	SEE DRAWING											

Hourglass Spring

Metalastik® 'Hourglass' Bearer Springs are in successful operation worldwide in a diversity of service applications including suspensions for LRV, metro, freight wagon and locomotives.

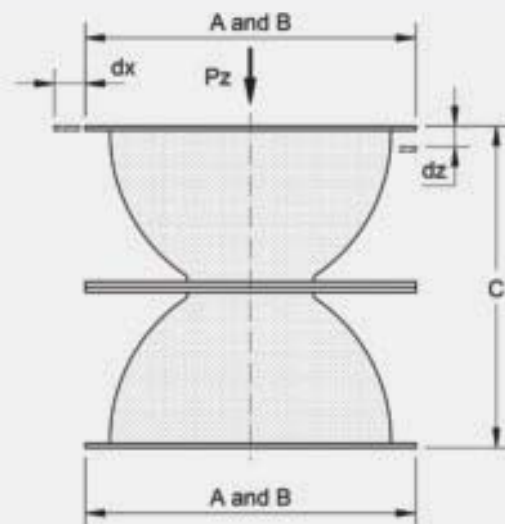
Designed and developed to provide an idealized interface between rail vehicle bodies and bogies, 'Hourglass' Bearer Springs allow all the relative displacements required by secondary suspensions, but with all the advantages of rubber springing, i.e. simplicity, reduced maintenance costs, improved ride characteristics and long service life.

Metalastik® 'Hourglass' Bearer Springs offer rail vehicle designers the solution of a high load capacity spring which exhibits excellent all round flexibility (vertical frequencies of 1.8 – 2.5 Hz).

The spring has a progressive load/displacement characteristic which achieves quasi-constant natural frequency. This means the same smooth ride is achieved whether at high or low vehicle loads. At the same time the progressive load/displacement minimises vehicle body height change, tare to laden. This is coupled with the ability to accomodate large horizontal, torsional and conical displacements.



Technical Drawing



Product Data

DRAWING No.	DIMENSIONS (mm)			VERTICAL LOAD Pz (kN)	VERTICAL DEFLECTION dz (mm)	HORIZONTAL DEFLECTION dx (mm)	WEIGHT (kg)
	A	B	C				
42-100mm SHEAR DEFLECTION							
17/2252	240	240	154	43	52	48	8.6
17/1653	432	370	376	63	142	120	46
17/1980	400	370	354	130	100	95	46
17/2173	320	320	311	38	119	100	19
17/1863	320	320	311	56	119	100	19
100-120mm SHEAR DEFLECTION							
17/1869	362	340	332	90	118	100	22
17/2171	432	384	376	75	142	120	42
17/1946	470	470	462	200	164	120	42.6
17/1658	570	570	370	250	128	120	92

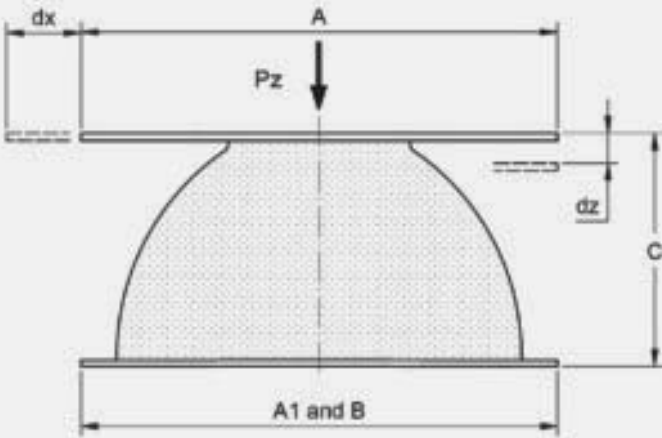
Parts listed are part of a wider range, details of which are available upon request.

Half Hourglass Spring



Technical Drawing

20-60 mm Shear Deflection



Product Data

DRAWING No.	DIMENSIONS mm				VERTICAL LOAD Pz (kN)	VERTICAL DEFLECTION dz (mm)	HORIZONTAL DEFLECTION dx (mm)	WEIGHT (kg)
	A	A1	B	C				
20-60mm SHEAR DEFLECTION								
17/2134	240	240	240	77	43	26	20	4.3
17/1948	370	432	384	188	75	71	53	19.2
12/1822	284	360	330	138	99	50	40	14
17/1818	370	420	420	188	100	72	55	20.4
17/1950	495	470	470	231	200	82	60	43

Level Mount

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

The rubber element of the level mount is oil and chemical resistant. All metal parts are zinc-plated and chromated for protection against corrosion.

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

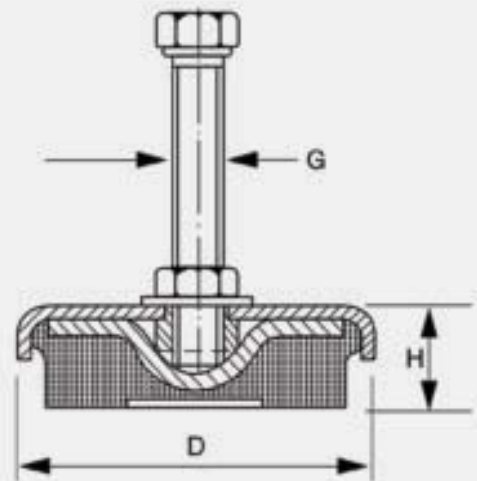
The mount, with level adjuster, is suitable for a wide range of free standing workshop machines.

Typical Applications Include:

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



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)			OVERALL BOLT LENGTH (mm)	MAX LOAD (kg)	WEIGHT (kg)
			D	H	G			
19-0588	20-00623	TF 250	69	23	M 12	100	250	0.4
19-0589	20-00678	TF 250 S/S	69	23	M 12	100	250	0.4
19-0583	20-00624	TF 600	81	25	M 12	100	600	0.49
19-0585	20-00679	TF 600 S/S	81	25	M 12	100	600	0.49
19-0577	20-00625	TF 1200	108	29	M 16	100	1200	1
19-0578	20-00680	TF 1200 S/S	108	29	M 16	100	1200	1
19-0591	20-00626	TF 3000	151	35	M 20	120	3000	2.2
19-0596	20-00627	TF 4000	170	39	M 20	120	4000	2.9
19-0598	20-00628	TF 6000	205	44	M 20	150	6000	4.8

Low Frequency Mountings

These anti-vibration mountings are designed to give large deflection for small loads and are used to protect suspended equipment against vibration and impact. Low Frequency Mountings are available in three sizes and two grades of rubber hardness.

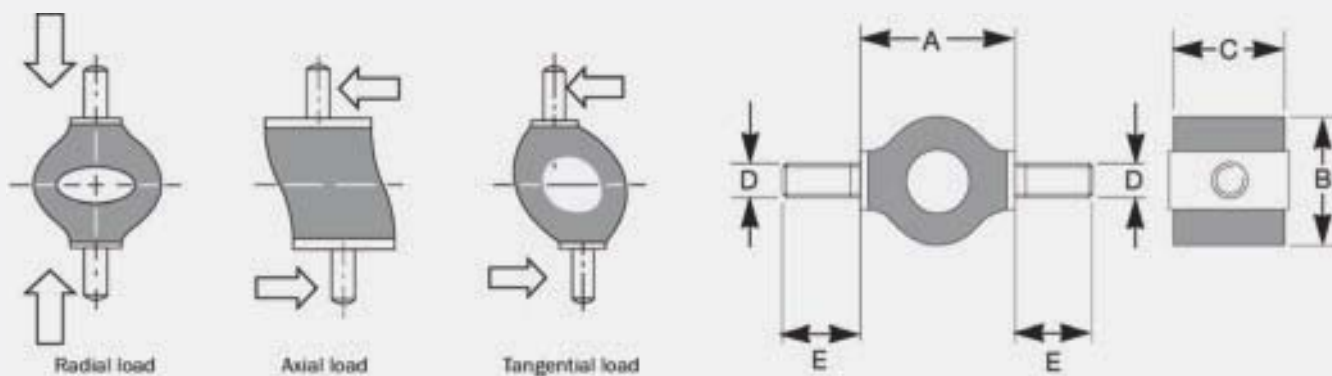
Novibra® type Low Frequency are designed for shear as well as compressive loads. Continual tensile load should be avoided.

Typical applications Include:

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



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					MAX LOAD (kg)			MAX TORQUE (Nm)	WEIGHT (kg)
			A	B	C	D	E	COMPRESSION	SHEAR	ROLLING SHEAR		
17-1394	20-00017	45 IRH	17	14	13	M4	10	1.4	0.4	0.3	1.6	0.01
	20-00018	60 IRH						1.8	0.5	0.4		
17-1395	20-00020	45 IRH	30	25	19	M5	14	3.1	1.0	0.8	3.2	0.015
	20-00021	60 IRH						5.6	1.5	1.2		
17-1396	20-00022	45 IRH	38	35	25	M6	15	8.7	3.1	2.5	8.3	0.038
	20-00023	60 IRH						12.7	4.6	3.6		

M Mounting

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

It's unique construction and the latest production methods make Novibra type M a high performance anti-vibration mounting with a number of advantages:

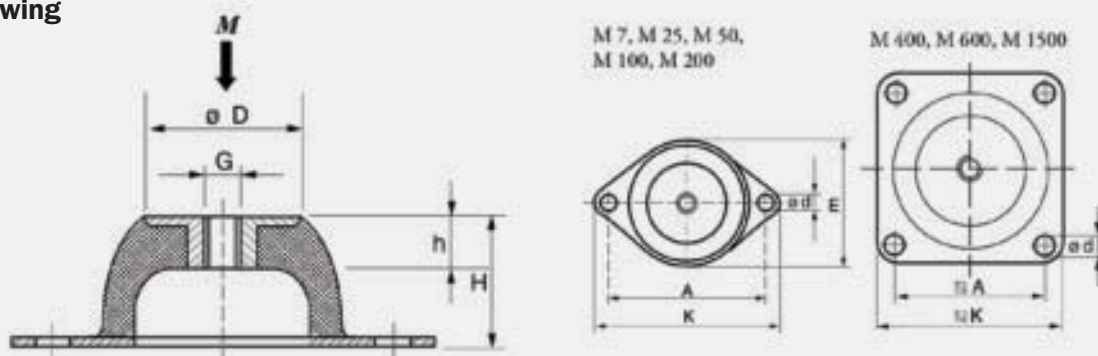
- Tight tolerance on dynamic stiffness rates for accurate vibration calculations.
- Wide load rating options, 3.5-2500 kg
- Corrosion protected to cope with arduous environments on land or marine applications (ISO 2081).
- Clear and durable product markings so that the mountings can be identified even after several years in operation.



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

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

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)	WEIGHT (kg)
			D	E	A	K	H	h	d	G		
17-4056	10-00139	M 7 40 IRH	18	43	50	64	20	7	7	M6	3.5	0.02
17-4057	10-00140	M 7 60 IRH	18	43	50	64	20	7	7	M6	9	
17-4047	10-00094	M 25 40 IRH	33	56	66	85	25	11	8	M8	20	0.07
17-4048	10-00095	M 25 60 IRH	33	56	66	85	25	11	8	M8	50	
17-4052	10-00096	M 50 40 IRH	45	76	92	114	35	14	10	M10	40	0.16
17-4053	10-00097	M 50 60 IRH	45	76	92	114	35	14	10	M10	80	
17-4041	10-00100	M 100 40 IRH	53	96	110	136	40	15	11.5	M10	70	0.26
17-4042	10-00099	M 100 60 IRH	53	96	110	136	40	15	11.5	M10	150	
174044	10-00102	M 200 40 IRH	58	101	124	151	45	13	11.5	M10	130	0.42
17-4045	10-00103	M 200 60 IRH	58	101	124	151	45	13	11.5	M10	220	
17-4050	10-00104	M 400 40 IRH	78	-	120	150	63	18	14.5	M12	280	1.06
17-4051	10-00105	M 400 60 IRH	78	-	120	150	63	18	14.5	M12	500	
17-4054	10-00080	M 600 40 IRH	100	-	160	200	85	25	14.5	M16	380	2.35
17-4055	10-00081	M 600 60 IRH	100	-	160	200	85	25	14.5	M16	750	
17-4043	10-00082	M 1500 40 IRH	186	-	250	310	160	43	18	M24	1400	9.43
17-4049	10-00083	M 1500 60 IRH	186	-	250	310	160	43	18	M24	2500	

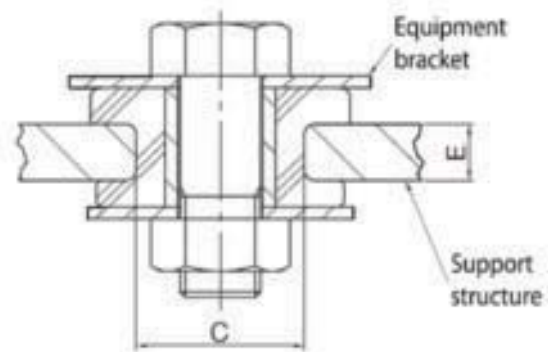
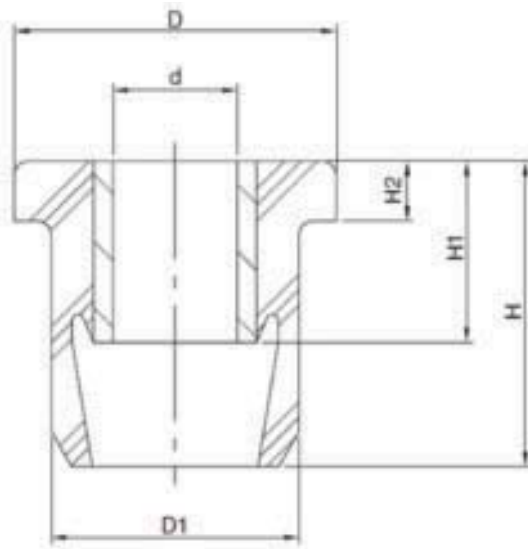
MCR Mount

MCR mountings are designed for mobile applications where the disturbing frequencies are high and restricted movement is needed. The MCR mount is an easy to install single part mount that can be used to take up small bracket and chassis misalignments, it provides isolation of high frequency vibration and offers shock protection of vehicle mounted equipment.

Typical Applications Include:

- Exhaust system
- Radiator mounting
- Auxiliary pumps

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS IN mm									MAX LOAD (kg)	BOLT SIZE	MAX BOLT TORQUE (Nm)	WASHER PART No.	WEIGHT (kg)
			d	D	D1	H	H1	H2	E	C	R					
19-0266	20-01129	MCR 27-1908-45	27.5	10	20	25.5	15.5	5	8	19	1.5	40	M10	30	20-00531	0.02
	20-00831	MCR 27-1908-60	27.5	10	20	25.5	15.5	5	8	19	1.5	55				
11-1196	20-00782	MCR 45-2810-45	45	13	31.5	32	25	10	10	28.5	1.5	80	M12	50	20-00416	0.06
	20-01137	MCR 45-2810-60	45	13	31.5	32	25	10	10	28.5	1.5	150				
13-4285	20-01133	MCR 51-3216-45	51.8	13.5	34	41	35	13.5	16	31.8	1.5	80	M12	50	20-00536	0.08
	20-01134	MCR 51-3216-60	51.8	13.5	34	41	35	13.5	16	31.8	1.5	180				
19-0277	20-00833	MCR 64-3820-45	64	16	41	50	43	16	20	38	3	190	M16	135	20-01495	0.17
	20-01130	MCR 64-3820-60	64	16	41	50	43	16	20	38	3	380				
19-0292	20-01135	MCR 75-4624-45	75	16	50	56	50	21	23.5	46	3	200	M16	135	20-00532	0.25
	20-01136	MCR 75-4624-60	75	16	50	56	50	21	23.5	46	3	400				
11-1018	20-01131	MCR 95-5119-45	95	21	57	63	51	25	19.1	50.8	3	320	M20	135	20-00533	0.39
	20-01132	MCR 95-5119-60	95	21	57	63	51	25	19.1	50.8	3	625				

MDS Mount

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.

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

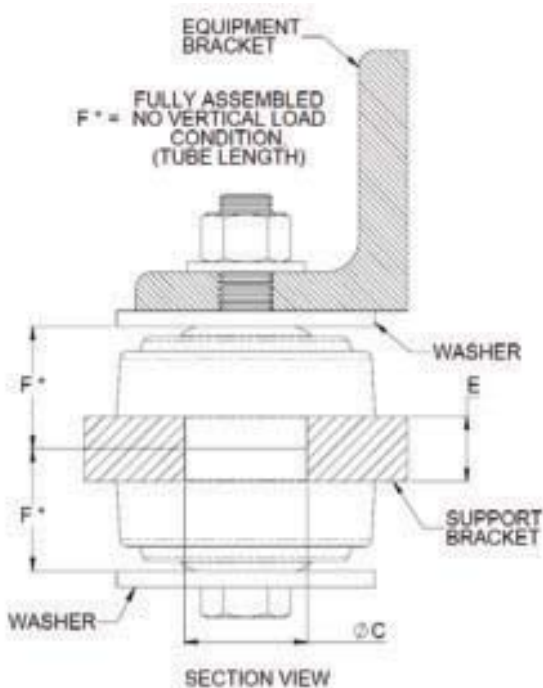
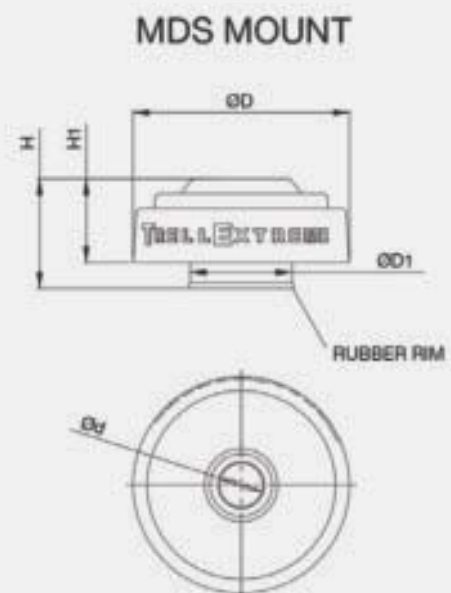
In the static working load range, the MDS mounts have linear stiffness characteristics allowing easy prediction of mount deflection and isolation performance. (see fig. 1)

Typical Applications Include:

- Engines and small cabs on off-highway vehicles



Technical Drawing



MDS Mount Continued

Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)	AXIAL STIFFNESS (N/mm)	BOLT SIZE	MAX BOLT TORQUE (Nm)	WEIGHT (kg)
			d	D	D1	H	H1	C	E (+/- 0/5MM)	F*					
17-4967	10-02183	MDS 55-45	13	55.5	29.8	22	29	28.8-30.2	15	26.5	40	186	M12	125	0.1
17-4967	10-04797	MDS 55-55	13	55.5	29.8	22	29	28.8-30.2	15	26.5	65	300	M12	125	0.1
17-4967	10-04817	MDS 55-65	13	55.5	29.8	22	29	28.8-30.2	15	26.5	95	450	M12	125	0.1
17-2280	10-01802	MDS 66-45	18.8	66	39.8	39	29.5	40.0-40.3	19.5	35	70	320	M16	240	0.18
17-2280	10-01803	MDS 66-55	18.8	66	39.8	39	29.5	40.0-40.3	19.5	35	120	540	M16	240	0.18
17-2280	10-01804	MDS 66-65	18.8	66	39.8	39	29.5	40.0-40.3	19.5	35	170	800	M16	240	0.18
17-2243	10-01799	MDS 80-45	16.2	80	37.8	41.5	32	37.9-38.2	19.5	37.5	90	350	M16	240	0.26
17-2243	10-01800	MDS 80-55	16.2	80	37.8	41.5	32	37.9-38.2	19.5	37.5	140	550	M16	240	0.26
17-2243	10-01801	MDS 80-65	16.2	80	37.8	41.5	32	37.9-38.2	19.5	37.5	200	800	M16	240	0.26
17-2241	10-03705	MDS85-45	16.2	88	41.8	40	32	42.0-42.3	16	35	90	400	M16	240	0.34
17-2241	10-02176	MDS85-55	16.2	88	41.8	40	32	42.0-42.3	16	35	140	700	M16	240	0.34
17-2241	10-04818	MDS85-65	16.2	88	41.8	40	32	42.0-42.3	16	35	200	1065	M16	240	0.34
17-4474	10-04816	MDS95-45	16.2	98	46.6	40	32	47.5-48.3	16	35	190	580	M16	333	0.41
17-4474	10-02256	MDS95-55	16.2	98	46.6	40	32	47.5-48.3	16	35	240	745	M16	333	0.41
17-4474	10-02255	MDS95-65	16.2	98	46.6	40	32	47.5-48.3	16	35	370	1135	M16	333	0.41
17-2285	10-03853	MDS 110-45	22.5	110	56.9	51.5	39	57.2-57.5	25	46.5	230	724	M20/M22	502/685	0.74
17-2285	10-03854	MDS 110-55	22.5	110	56.9	51.5	39	57.2-57.5	25	46.5	360	976	M20/M22	502/685	0.74
17-2285	10-03855	MDS 110-65	22.5	110	56.9	51.5	39	57.2-57.5	25	46.5	510	1382	M20/M22	502/685	0.74
17-4196	10-01984	MDS 130-45	30.2	128	69.2	58	43	70.75-71.25	40	57	230	700	M30	750	1.22
17-4196	10-01985	MDS 130-55	30.2	128	69.2	58	43	70.75-71.25	40	57	500	1160	M30	750	1.22
17-4196	10-01986	MDS 130-65	30.2	128	69.2	58	43	70.75-71.25	40	57	600	1600	M30	750	1.22

Metaxentric Bushes

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

The bush has the following features:

- Three dissimilar translational stiffnesses for the best vibration isolation and motion control.
- Load range from 138 - 464 kg
- Rising rate stiffness characteristics for overload conditions help to limit motion and transmitted acceleration.
- Robust and fail-safe, suitable for ROPS and FOPS cab structures.
- Simple to fit, the housing lends itself to robust structures.

Metaxentric Bushes are similar to conventional UD Bushes but with inner and outer sleeves offset radially. This feature provides a greater rubber thickness and hence increased flexibility in the normal direction of loading, whilst maintaining control in other modes and still allowing torsional movement.

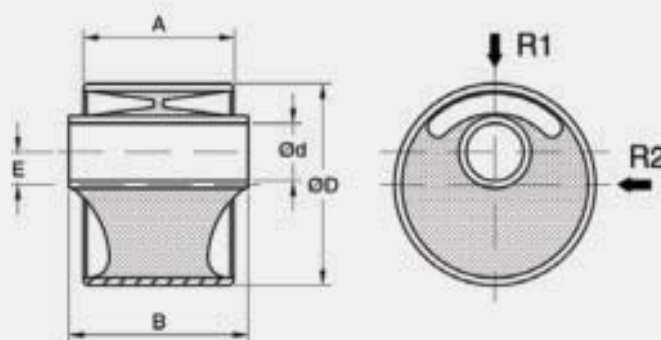
The rubber section is relieved to eliminate harmful tensile stresses.

Typical Applications Include:

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



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					DIRECTION R1			DIRECTION R2	WEIGHT (kg)
			d	D	A	B	E	STIFFN (N/mm)	MAX DEF. (mm)	MAX LOAD (kg)	STIFFN (N/mm)	
13-1270	10-00252	13-1270-50 IRH	16	47.6	50.8	63.5	7.1	675	2	138	1350	0.22
13-1270	10-00253	13-1270-60 IRH	16	47.6	50.8	63.5	7.1	1040	2	212	2080	0.22
13-1270	10-04553	13-1270-70 IRH	16	47.6	50.8	63.5	7.1	1200	2	245	2400	0.22
13-2691	10-00296	13-2691-50 IRH	24	75.3	20.8	70	10.5	750	3.5	268	600	0.56
13-2691	10-00297	13-2691-60 IRH	24	75.3	20.8	70	10.5	1200	3.5	325	910	0.56
13-2691	10-02228	13-2691-70 IRH	24	75.3	20.8	70	10.5	1760	3.5	628	1400	0.56
13-1165	10-00244	13-1165-50 IRH	25.4	88.9	66.7	79.4	14.3	475	3.8	184	640	0.89
13-1165	10-00245	13-1165-65 IRH	25.4	88.9	66.7	79.4	14.3	900	3.8	348	990	0.89
13-1355	10-00262	13-1355-45 IRH	43.7	101.6	63.5	72.4	9.5	682	3.5	243	1150	1.15
13-1355	10-00263	13-1355-60 IRH	43.7	101.6	63.5	72.4	9.5	1300	3.5	464	2200	1.15

Metacone

The metacone product range is 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. Typically the mountings are assembled with overload and rebound washers to control and limit movement of the suspended equipment under shock loads. Centre fixing bolts should be torque tightened to the recommended values.

Their compact fail-safe design is available for a wide range of loadings, with in some cases, alternative fixings.

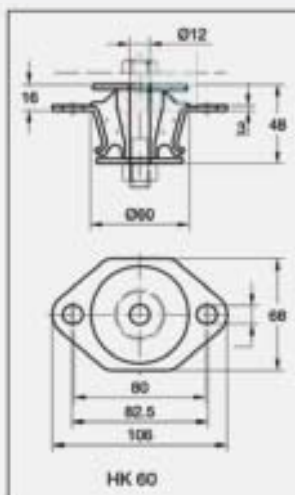
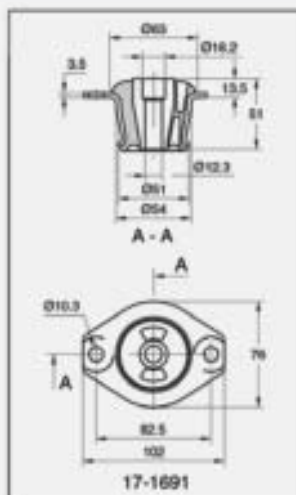
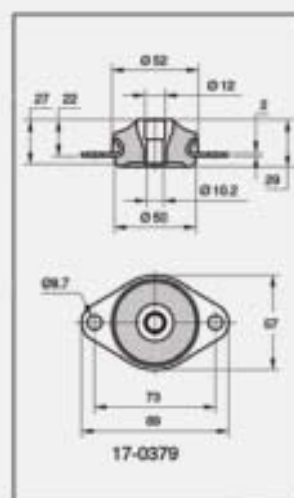
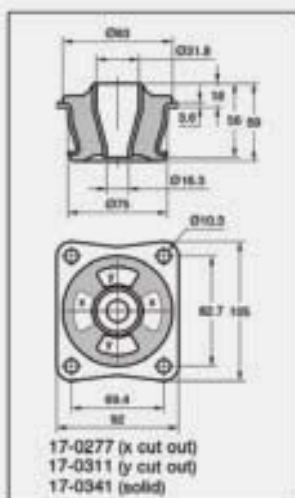
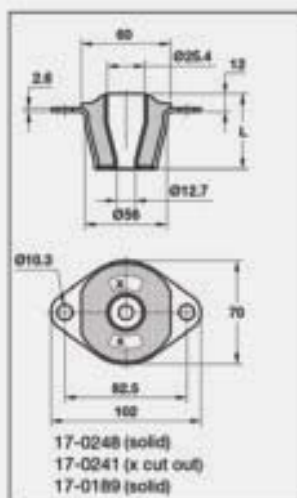
Cut-outs in rubber sections on various sizes provide different vertical/horizontal stiffness ratio.



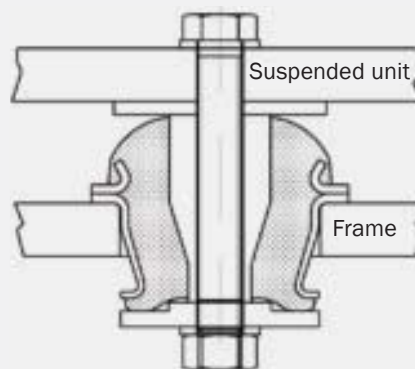
Typical Applications Include:

- Off-highway and road vehicle engines
- Vehicle cabs
- Oil tanks/ tankers

Technical Drawings

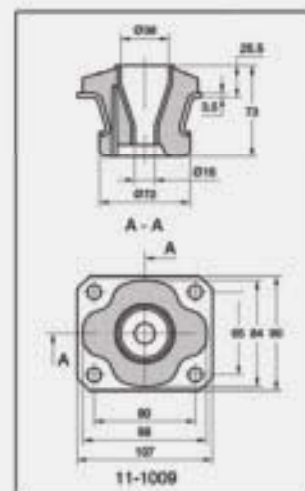
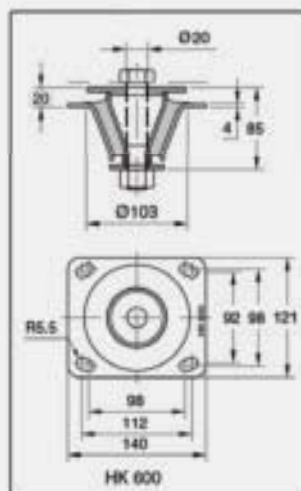
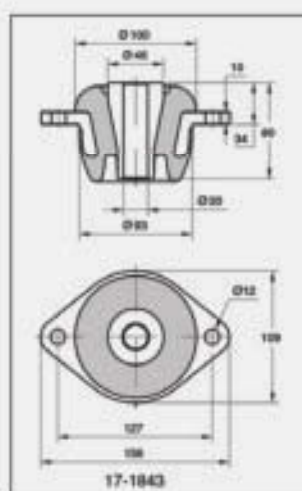
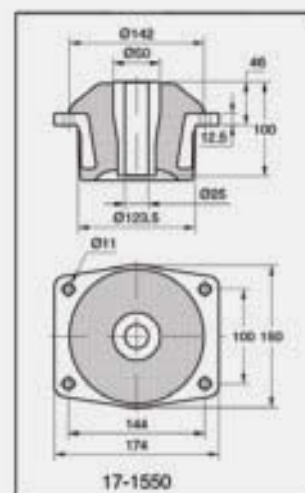
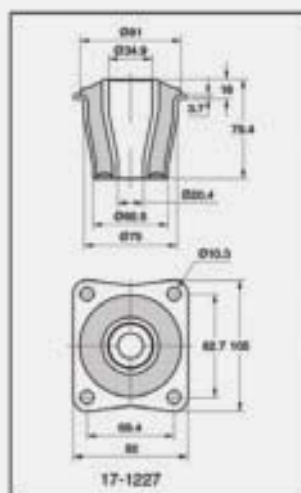
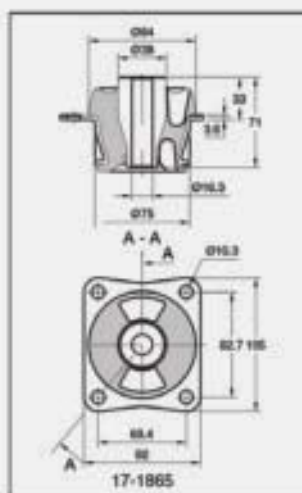
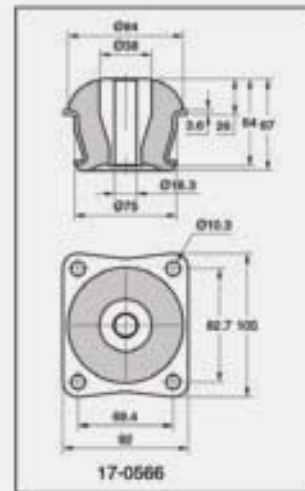
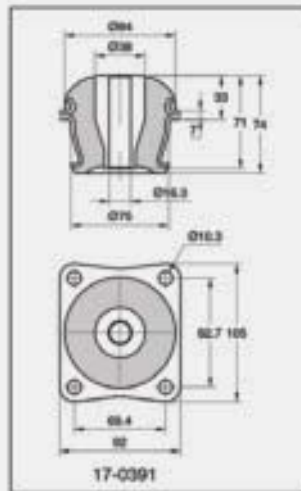
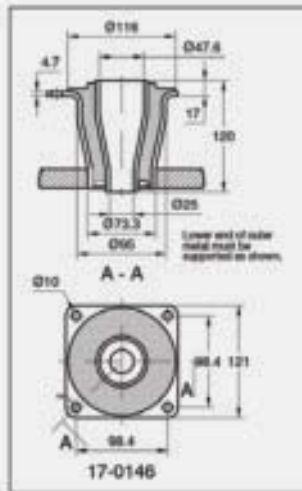


Installation



Metacone Continued

Technical Drawings



Metacone Continued

Product Data

DRAWING No.	PART No.	TYPE	MAX LOAD (kg)	BOLT SIZE	MAX BOLT TORQUE (Nm)	TOP WASHER PART No.	BOTTOM WASHER PART No.	WEIGHT (kg)
17-0379	10-00404	40 IRH	70	M10	25	20-00531	20-00531	0.12
17-0241	10-00374	45 IRH	62	M12	40	20-00529	10-03666	0.18
17-0241	10-00375	60 IRH	122	M12	40	20-00529	10-03666	0.18
17-0248	10-00379	45 IRH	95	M12	40	20-00529	10-03666	0.19
17-0248	10-00380	60 IRH	190	M12	40	20-00529	10-03666	0.19
17-4039	10-01119	HK 60-40 IRH	65	M12	40	20-01103	20-00416	0.24
17-4039	10-01122	HK 60-50 IRH	85	M12	40	20-01103	20-00416	0.24
17-4039	10-01120	HK 60-60 IRH	135	M12	40	20-01103	20-00416	0.24
17-4039	10-01121	HK 60-70 IRH	190	M12	40	20-01103	20-00416	0.24
17-0189	10-00365	45 IRH	145	M12	40	20-00529	10-03666	0.28
17-0189	10-00367	70 IRH	400	M12	40	20-00529	10-03666	0.28
17-1691	10-00566	45 IRH	72	M12	90	20-00535	20-00536	0.44
17-1691	10-00567	60 IRH	144	M12	90	20-00535	20-00536	0.44
17-0277	10-00385	45 IRH	125	M16	75	20-00773	20-00532	0.56
17-0277	10-00387	60 IRH	230	M16	75	20-00773	20-00532	0.56
17-0311	10-00391	45 IRH	125	M16	75	20-00773	20-00532	0.58
17-0311	10-00392	60 IRH	220	M16	75	20-00773	20-00532	0.58
17-0341	10-00394	45 IRH	160	M16	75	20-00773	20-00532	0.54
17-0341	10-00395	60 IRH	300	M16	75	20-00773	20-00532	0.54
17-0341	10-00396	70 IRH	430	M16	75	20-00773	20-00532	0.54

DRAWING No.	PART No.	TYPE	MAX LOAD (kg)	BOLT SIZE	MAX BOLT TORQUE (Nm)	TOP WASHER PART No.	BOTTOM WASHER PART No.	WEIGHT (kg)
11-1009	10-00192	45 IRH	140	M16	75	20-00532	20-00532	0.59
11-1009	10-00193	55 IRH	200	M16	75	20-00532	20-00532	0.59
17-0566	10-00433	45 IRH	200	M16	135	20-00532	20-00532	0.82
17-0566	10-00434	60 IRH	380	M16	135	20-00532	20-00532	0.82
17-0566	10-00435	70 IRH	525	M16	135	20-00532	20-00532	0.82
17-1865	10-00615	55 IRH	180	M16	135	20-00532	20-00532	0.86
17-0391	10-00411	45 IRH	290	M16	135	20-00532	20-00532	1.1
17-0391	10-00414	60 IRH	500	M16	135	20-00532	20-00532	1.1
17-0391	10-00415	70 IRH	610	M16	135	20-00532	20-00532	1.1
17-1227	10-00459	45 IRH	560	M20	180	20-00528	10-03707	1.1
17-1227	10-00460	60 IRH	1000	M20	180	20-00528	10-03707	1.1
17-1843	20-02529	45 IRH	320	M24	160	20-00533	20-00533	1.7
17-1843	20-02530	60 IRH	600	M24	160	20-00533	20-00533	1.7
17-1550	20-02522	45 IRH	720	M24	260	20-00534	20-00534	4.4
17-1550	20-02523	60 IRH	1250	M24	260	20-00534	20-00534	4.4
17-4040	10-00190	HK 600-40 IRH	685	M20	160	20-00643	20-00644	1
17-4040	10-00191	HK 600-60 IRH	1260	M20	160	20-00643	20-00644	1
17-0146	10-00360	45 IRH	950	M24	200	20-00527	10-03862	2

Metacone® Primary Spring

The Metacone® Primary Spring is an easily fitted and compact suspension unit in which the rubber is loaded in combined shear and compression.

Optimum load-deflection properties, i.e. high load capacity and large static deflections can be provided within acceptable space envelope limitations.

The range illustrated caters for static vertical loads and deflections up to 50kN and 40mm respectively, which are typically suitable for many primary suspension requirements.

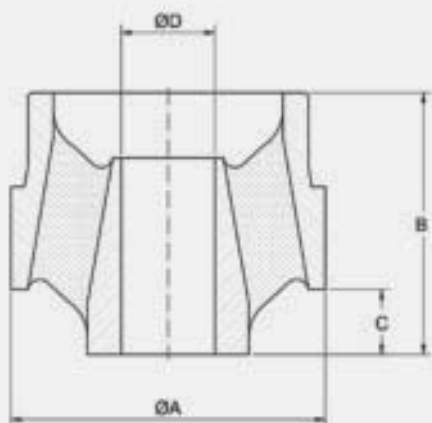
These springs may also be considered for secondary suspensions and power unit applications.

Metacone® Primary Springs generally provide the same stiffness rates in the principal horizontal modes but alternative designs with dissimilar horizontal stiffness rates can be produced.

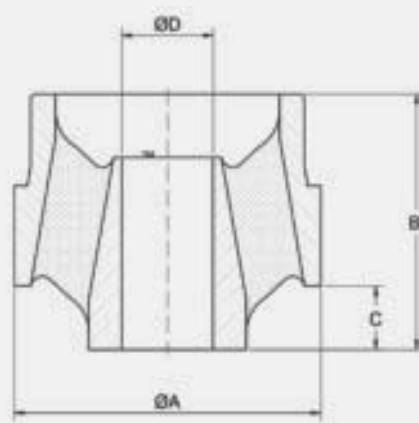


Technical Drawing

20-40 mm
Vertical Deflection



21-40 mm
Vertical Deflection



Product Data

DRAWING No.	DIMENSIONS (mm)					NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	WEIGHT (kg)
	A	B	C	D	E						
17/2083	185	153	38	55		8.5	20	0.42	3.4	3.4	7.3
17/1888	185	153	38	55		17	20	0.84	2.3	2.3	10.5
17/2105	150	143	41	-		24.8	20	1.21	4	4	5.25
17/1053	207	118	54	79		14	23	0.6	0.8	0.8	7.2
17/2047	260	319	103	-		31	32	3.6	4	4	24.5
17/1817	293	282	132	90		51	34	1.5	*	*	38.5
17/1836	275	243	103	-		34	38	0.9	9.5	9.5	30

Horizontal stiffness rates quoted in the tables above relate to the normal vertical load conditions and may vary with vertical deflection. Parts listed are part of a wider range, details of which are available upon request.

Nominal load = average load for passenger vehicles (crush load may be higher) and maximum load for freight vehicles

Novibra® AV Plate

The Anti-Vibration Plate is intended, primarily, for applications with low requirement for vibration isolation.

Typical installations are machinery generating vibrations in the high frequency range, and tall unstable installations, requiring secure attachments to the foundation. If insufficient deflection is achieved with a single layer, multiple layers can be used by separating each layer with a weight distributing steel plate.

In order to avoid direct contact between machine and foundation, a rubber bushing (e.g. rubber hose) should be installed in the mounting holes prior to installation of bolt and rubber washer.

The AV Plate, made of oil and grease resistant rubber material, is available either as a single (4.5 mm) or as a double (8 mm) version.

The single version has ribs on one side only, while the double has ribs on both sides applied at a 90 degree angle to each other.

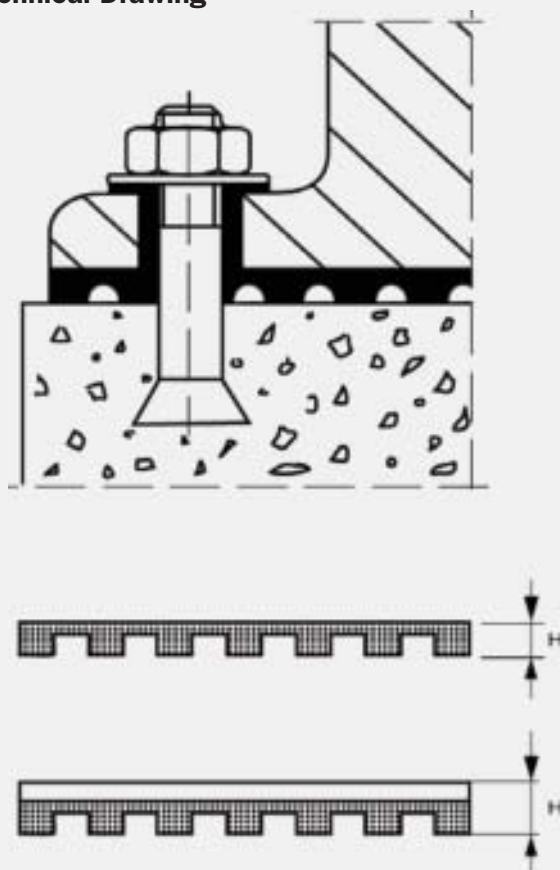
Good performance is obtained when using the Novibra AV Plate in the building and construction industry as support pads between flooring and joists. This application provides for cushioning of loads and isolation of high frequency vibrations within the building.

Typical Applications Include:

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



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)		MAX LOAD (kg/cm ²)	WEIGHT (kg)
			L . B	H		
15-4039	10-00019	SINGLE PLATE	600-500	4.5	5	1.21
15-4038	10-00020	DOUBLE PLATE	600-500	8	5	1.82
15-4057	20-01798	AV DOUBLE PLATE	500-500	8	5	1.51
15-4080	20-01667	AV DOUBLE PLATE	500-500	10	5	1.89

RA Mounting

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

Its unique construction and the latest production methods make the Novibra RA a high performance mount, with a number of advantages:

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



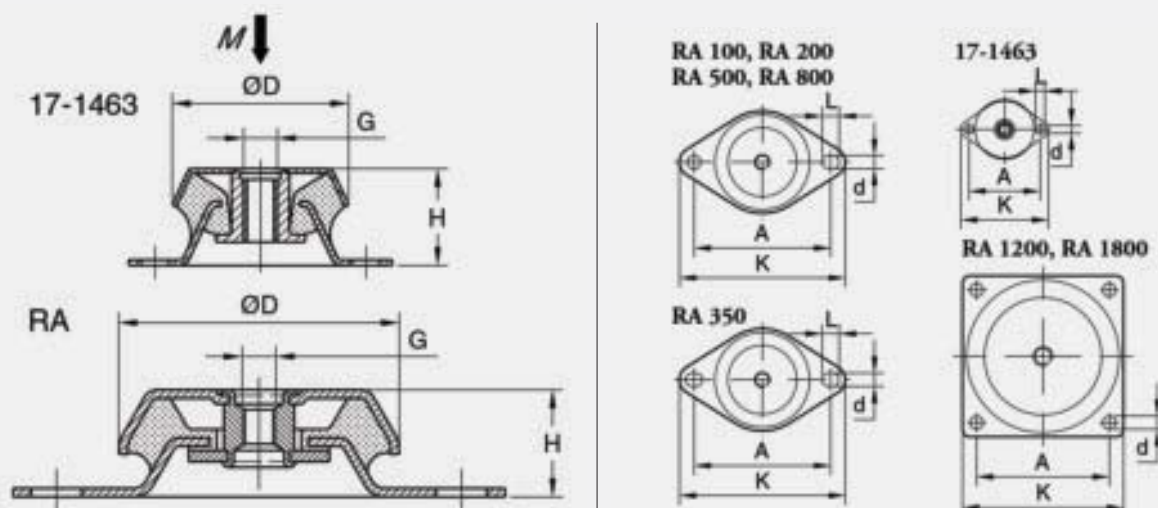
Typical Applications Include:

- Pumps
- Fans
- Converters
- Compressors
- Combustion engines
- Industrial and Marine gensets
- Generators

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

RA Mounting Continued

Technical Drawing



Product Data

DRAWING No.	PART No.	type	DIMENSIONS (mm)							MAX LOAD (kg)	WEIGHT (kg)
			D	A	H	K	d	L	G		
17-2320-1	10-00106-01	RA 100/M10 40 IRH	79	110	30	130	9	12	M10	105	0.33
17-2321-1	10-00107-01	RA 100/M10 60 IRH	79	110	30	130	9	12	M10	240	0.33
17-2322-3	10-00166-01	RA 100/M12 40 IRH	79	110	30	130	9	12	M12	105	0.33
17-2323-1	10-00167-01	RA 100/M12 60 IRH	79	110	30	130	9	12	M12	240	0.33
17-2326-1	10-00110-01	RA 200/M10 40 IRH	94	124	35	150	10	15	M10	180	0.47
17-2327-1	10-00111-01	RA 200/M10 60 IRH	94	124	35	150	10	15	M10	280	0.47
17-2328-3	10-00165-01	RA 200/M12 40 IRH	94	124	35	150	10	15	M12	180	0.47
17-2329-1	10-00091-01	RA 200/M12 60 IRH	94	124	35	150	10	15	M12	280	0.47
17-2330-3	10-00172-01	RA 350/M12 40 IRH	101	140-148	38	175	14	18	M12	250	0.74
17-2331-1	10-00173-01	RA 350/M12 60 IRH	101	140-148	38	175	14	18	M12	450	0.74
17-2332-2	10-00112-01	RA 350/M16 40 IRH	101	140-148	38	175	14	18	M16	250	0.74
17-2333-1	10-00113-01	RA 350/M16 60 IRH	101	140-148	38	175	14	18	M16	450	0.74
17-2334-1	10-00116-01	RA 500 40 IRH	123	158	42	192	14	18	M16	450	1.02
17-2335-1	10-00117-01	RA 500 60 IRH	123	158	42	192	14	18	M16	700	1.02
17-4016-1	10-00118-01	RA 800 40 IRH	144	182	46	216	14	18	M16	750	1.59
17-4017-1	10-00119-01	RA 800 60 IRH	144	182	46	216	14	18	M16	1300	1.59
17-4031-1	10-00154-01	RA 1200 40 IRH	161	140	58	170	14	-	M20	900	2.19
17-4032-2	10-00155-01	RA 1200 60 IRH	161	140	58	170	14	-	M20	1600	2.19
17-4033-2	10-00156-01	RA 1800 40 IRH	181	160	66.5	190	14	-	M20	1300	2.33
17-4034-1	10-00157-01	RA 1800 60 IRH	181	160	66.5	190	14	-	M20	2100	2.33

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)							MAX LOAD (kg)	WEIGHT (kg)
			D	A	H	K	d	L	G		
17-1463-1	10-00503-01	35 IRH	65	76.2	35	94	8.5	10	M12	55	0.22
17-1463-1	10-00504-01	45 IRH								80	
17-1463-1	10-00505-01	60 IRH								170	
17-1463-1	10-00506-01	70 IRH								240	

RAB Mounting

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

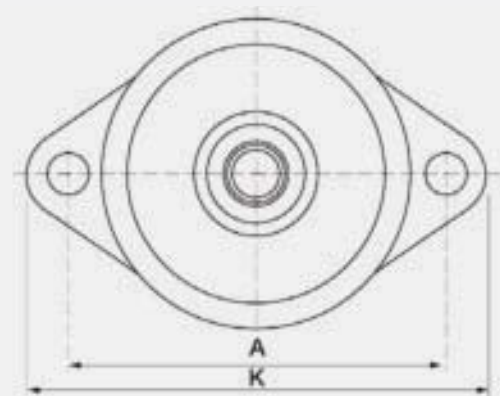
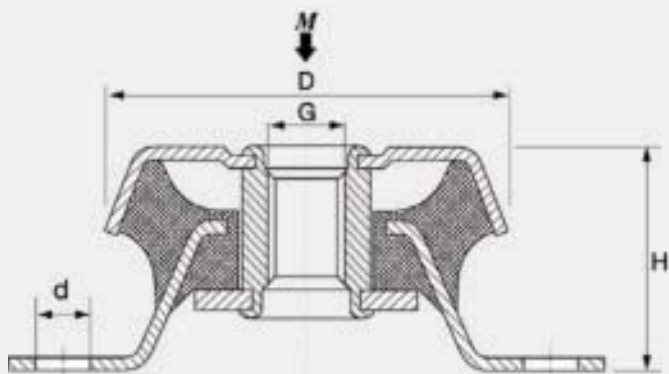
Its unique construction and the latest production methods make Novibra type RAM a high performance mounting having a number of advantages:

- Rubber features are utilized effectively combining compression and shear
- Tight tolerances on dynamic stiffness rate for accurate vibration calculations
- Loading rating options, 10-130 kg
- Corrosion protected to cope with arduous environments on land or marine applications (SO 2081)



- Fitted as standard with a shock proof device with resilient stop, ideal for mobile marine use. The RAB mounts can accommodate occasional shock loads up to 5 g reference to the weight. The mount will withstand shock loads up to 2 g without plastic deformation
- Clear and durable product markings so the mount can be identified even after several years in operation
- Domed shape cover to protect against oil contamination

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)						MAX LOAD (kg)	WEIGHT (kg)
			D	A	H	K	d	G		
17-4004-1	10-00180	RAB 3	63	76	35	93.5	8.5	M12	70	0.22
17-4141-1	10-00179	RAB 2	63	76	35	93.5	8.5	M12	105	0.22
17-4092-1	10-00178	RAB 0	63	76	35	93.5	8.5	M12	130	0.22

RAEM Mounting

The RAEM is a universal mounting for applications demanding maximum vibration isolation. It is a further development of the RA mount, where EM stands for 'extra movement' and is suitable for both light and heavy machines.

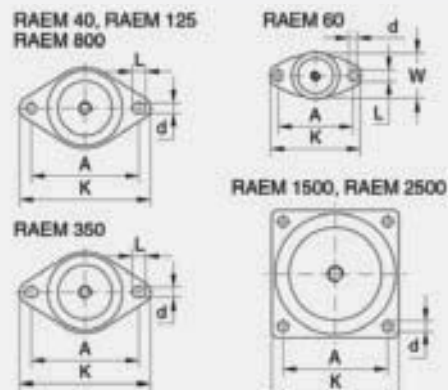
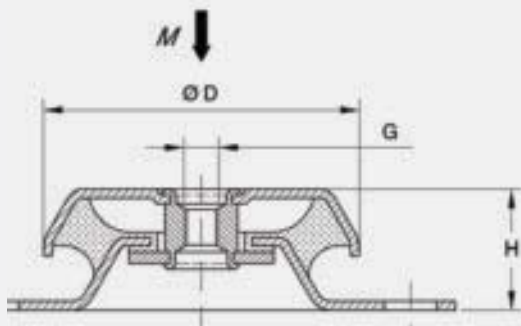
For normal speeds of 1500 rpm the RAEM type provides a degree of isolation of 85-95%, and gives good isolation with low frequency machines.

The Novibra RAEM is a high performance mount, with a number of advantages:

- RAEM offers nominally 70% extra deflection over standard RA mounts.
- Wide load rating options, 10-3400 kg.
- Corrosion protected to cope with arduous environments on land or marine applications.
- Fitted as standard with a shock proof device with resilient stop, ideal for mobile marine use. The RAB mounts can accommodate occasional shock loads up to 5 g reference to the weight. The mount will withstand shock loads up to 2 g without plastic deformation
- Clear and durable product markings so the mount can be identified even after several years in operation
- Domed shape cover to protect against oil contamination



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								MAX LOAD (kg)	WEIGHT (kg)
			D	A	H	K	d	L	G			
17-4023-1	10-00112	RAEM 40 40 IRH	64	88	35.5	110	9	12	M10	30	0.26	
17-4024-1	10-00123	RAEM 40 60 IRH	64	88	35.5	110	9	12	M10	60	0.26	
17-4025-1	10-00183	RAEM 60 40 IRH	63	100	35.5	120	11	15	M12	60	0.3	
17-4026-1	10-00184	RAEM 60 60 IRH	63	100	35.5	120	11	15	M12	120	0.3	
17-2336-1	10-00108	RAEM 125 40 IRH	84	110	35.5	135	11	15	M10	80	0.37	
17-2338-1	10-00109	RAEM 125 60 IRH	84	110	35.5	135	11	15	M10	180	0.37	
17-2336-2	10-00168	RAEM 125 40 IRH	84	110	35.5	135	11	15	M12	80	0.37	
17-2338-2	10-00169	RAEM 125 60 IRH	84	110	35.5	135	11	15	M12	180	0.37	
17-2341-1	10-00174	RAEM 350 40 IRH	110	140-148	42	175	14	18	M12	200	0.8	
17-2342-1	10-00175	RAEM 350 60 IRH	110	140-148	42	175	14	18	M12	400	0.8	
17-2341-2	10-00114	RAEM 350 40 IRH	110	148-148	42	175	14	18	M16	200	0.8	
17-2342-2	10-00115	RAEM 350 60 IRH	110	148-148	42	175	14	18	M16	400	0.8	
17-2347-2	10-00120	RAEM 800 40 IRH	155	182	54	216	14	18	M16	450	1.8	
17-2348-1	10-00121	RAEM 800 60 IRH	155	182	54	216	14	18	M16	800	1.8	
17-4020-1	10-00158	RAEM 1500 40 IRH	182	146	85	180	14	-	M20	900	3	
17-4018-1	10-00159	RAEM 1500 60 IRH	182	146	85	180	14	-	M20	1700	3	
17-4021-2	10-00160	RAEM 2500 40 IRH	224	80	105.5	220	17.5	-	M24	1700	4.6	
17-4022-1	10-00161	RAEM 2500 60 IRH	224	80	105.5	220	17.5	-	M24	3400	4.6	

Rectangular SAW Mounting

Rectangular SAW mountings are also known as 'Sandwich' mountings because they feature a rubber section sandwiched between plates of metal.

This arrangement allows a large difference between the compression and shear stiffnesses, thus providing the potential to 'tune' a mounting system by rotating the mountings.

These mountings are commonly installed in a 'Vee' formation to utilize this feature.

The Rectangular SAW Mountings has the following features:

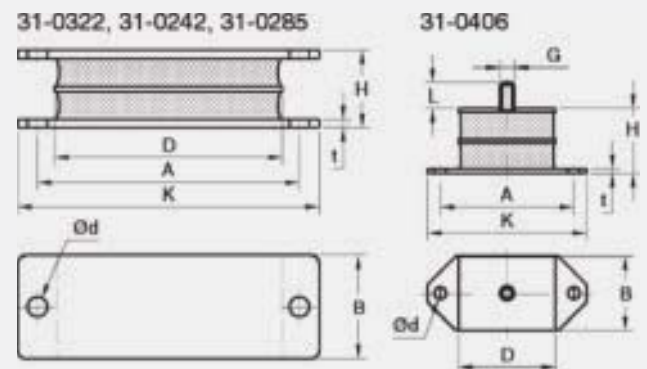
- Available with plate or stud fixings.
- Can be loaded in compression or shear, or a combination of both, for example in a 'Vee' arrangement.
- Can be manufactured with or without interleaves to change the ratio of shear to compression stiffness.



Typical Applications Include:

- Low frequency machinery
- Vibratory screens
- Crushing equipment
- Engine mounts

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)									MAX LOAD (Kg)		WEIGHT (kg)
			A	B	K	H	D	d	t	G	L	COMPRESSION	SHEAR	
31-0406	10-00661	45 IRH										90	40	0.23
	10-00971	60 IRH	74.5	41	89	36	54	6.5	2.5	M8	14	180	70	
	10-00663	70 IRH										250	90	
31-0322	10-00658	45 IRH	89	57	108	43	63.5	11	5	-	-	180	50	0.65
	10-00659	60 IRH										360	75	
31-0285	10-00656	45 IRH	146	57	168	43	127	11	5	-	-	275	150	0.9
	10-00657	60 IRH										546	150	
31-0242	10-00648	45 IRH										450	120	1.1
	10-00651	60 IRH	146	57	168	43	127	11	5	-	-	900	150	
	10-00652	70 IRH										1050	150	

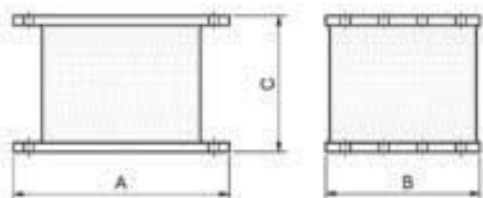
Sandwich Mount

This range of mountings is suited to the suspension of heavy equipment and machinery, and is extensively used as a flexible mounting for large medium speed diesel marine propulsion units. The ratio of compression to shear stiffness rates can be varied by incorporating rigid interleaved plates in the rubber section, thereby enabling the overall suspension properties to be optimized to isolate the major disturbing vibrations.

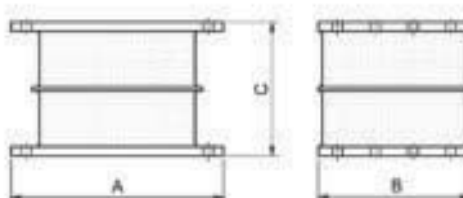
The mountings are usually installed in a vee arrangement and when correctly positioned, afford a high level of vibration isolation whilst at the same time keeping movement of the suspended equipment, under the action of external forces, to a minimum.



Non Interleaved

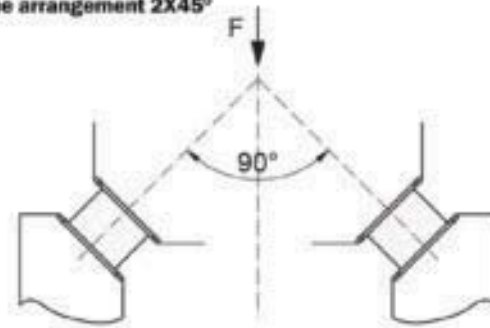


Interleaved



Mountings are frequently used in a vee arrangement for the suspension of large medium speed diesel engines. Typical arrangement and properties are shown in the adjacent diagram.

Vee arrangement 2X45°



Product Data

DRAWING No.	TYPE	DIMENSIONS (mm)			No. OF INTERLEAVES	MAX LOAD COMPRESSION (mm)	MAX STATIC DEFLECTION COMPRESSION (mm)	COMPRESSION STIFFNESS (N/mm)		SHEAR STIFFNESS (N/mm)		VEE ARRANGEMENT 2X45°		WEIGHT (kg)
		A	B	C				STATIC	DYN.	STATIC	DYN.	MAX VERTICAL LOAD (kN)	MAX VERTICAL DEFLECTION (mm)	
17-1666	45 IRH	280	200	175	-	11.8	15	890	1000	120	150	20.5	21	17.2
	60 IRH	280	200	175	-	22		1650	2170	250	325	38	21	
17-1742	45 IRH	280	200	127	-	13.2	10	1600	1840	200	230	24	14	14
	60 IRH	280	200	127	-	24.5		3000	3900	375	490	46	14	
17-1783	45 IRH	460	268	109	-	46	8.5	5750	6610	600	690	69	11	29.8
	60 IRH	460	268	109	-	84		10750	14000	1125	1460	132	11	
17-2181	45 IRH	460	268	109	1	83	8	13500	15500	515	590	147	10.5	30.5
	60 IRH	460	268	109	1	155		25500	33200	965	1255	280	10.5	
17-0434	45 IRH	460	268	109	2	224	7.5	28750	33000	575	660	310	10.5	34
	60 IRH	460	268	109	2	417		53900	70000	1080	1400	584	10.5	

N.B in many cases, the horizontal shear stiffness rates will reduce under compressive forces, - see graph overleaf

SAW® Mounting

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

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

The combination of a stable low installation height, high compressive strength and low shear stiffness makes Novibra® type SAW® a versatile high performance anti-vibration mounting. The 4 clearance holes in each fixing plate allow easy installation.

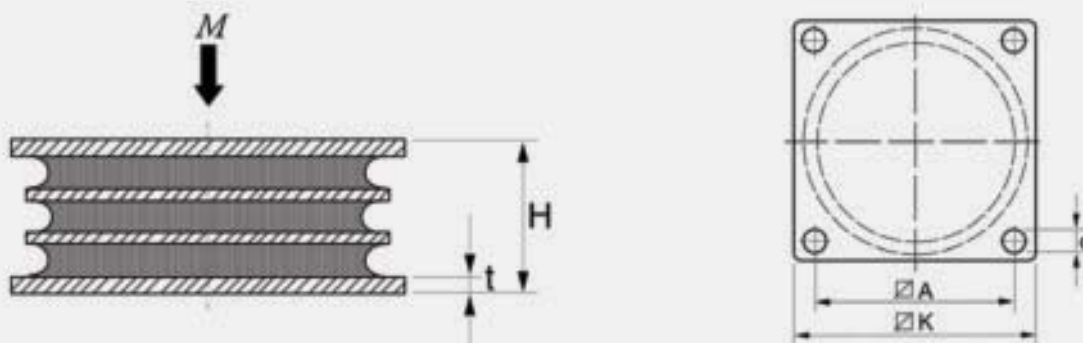
By connecting 2 SAW®- elements in a series, i.e. one on top of the other, an increased isolation efficiency is achieved in both shear and compression planes. Where larger deflections are required in the vertical plane, Novibra® type SAW® mountings are mounted at a calculated angle configuration to provide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



Typical Applications Include:

- Crushers
- Edge Runners
- Mills
- Hoppers and feeders
- Grinders
- Vibratory rollers
- Screens

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					MAX LOAD M (kg)	WEIGHT (kg)
			k	H	d	t			
17-4058	10-00141-01	SAW 125 40 IRH	118	148	52	13.5	5	2250	2.6
17-4058	10-00142-01	SAW 125 60 IRH	118	148	52	13.5	5	4500	2.6
17-4059	10-00143-01	SAW 150 40 IRH	136	166	63	13.5	6	3750	4.1
17-4059	10-00144-01	SAW 150 60 IRH	136	166	63	13.5	6	7500	4.1
17-4060	10-00075-01	SAW 200 40 IRH	184	220	82	17	8	6000	9.2
17-4060	10-00076-01	SAW 200 60 IRH	184	220	82	17	8	12000	9.2
17-4061	10-00077-01	SAW 300 40 IRH	270	310	120	22	10	15000	27
17-4061	10-00078-01	SAW 300 60 IRH	270	310	120	22	10	30000	27



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

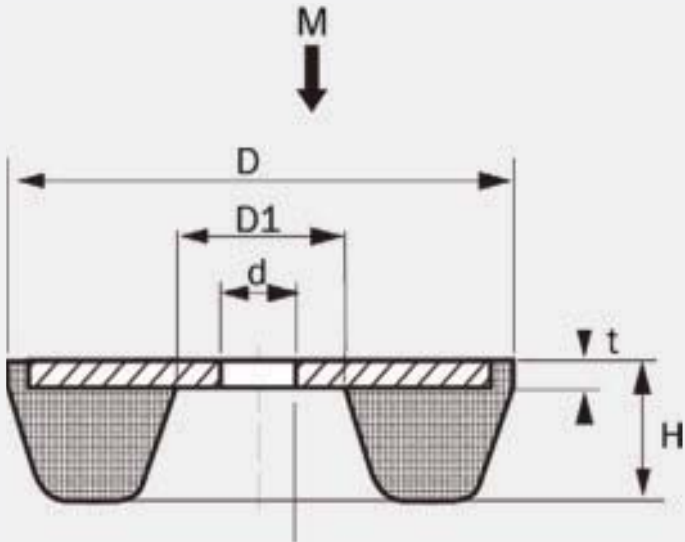
As the rubber element is in direct contact with the supporting surface, friction is normally sufficient to prevent the suspended equipment from “walking”.

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

Typical Applications Include:

- Office equipment
- Textile machinery
- Domestic appliances
- Electric motors
- Weighing equipment

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)					MAX LOAD M (kg)	WEIGHT (kg)
			D	D1	d	H	t		
19-0563	20-00612	SE 75	55	18	8	15	3	150	0.069
19-0728	20-00631	SE 250	75	25	10	17	4	400	0.172
19-0729	20-00632	SE 750	115	40	14	24	4	1100	0.456

Shearmount

Shearmounts are also known as 'Sandwich' mountings because they feature a rubber section sandwiched between plates of metal.

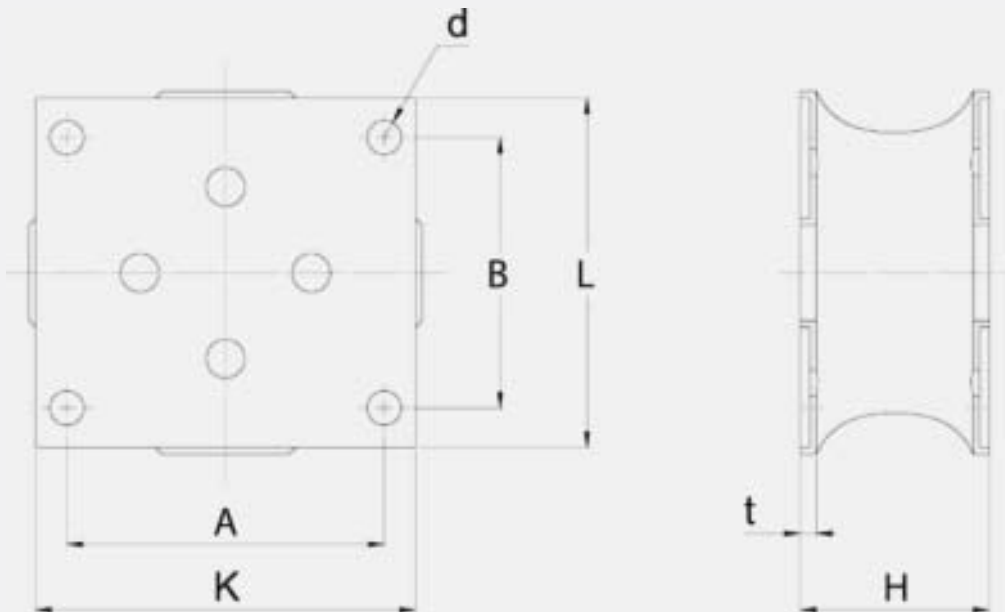
This arrangement allows a large difference between the compression and shear stiffnesses, thus providing the potential to 'tune' a mounting system by rotating the mountings.

These mountings are commonly installed in a 'Vee' formation to utilize this feature.



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

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)							MAX LOAD (kg)		MAX DEFLECTION (mm)		WEIGHT (kg)
			A	B	K	L	h	d	t	COMPRESSION	SHEAR	COMPRESSION	SHEAR	
17-4487-1	10-01618	2"COMP 60 IRH	100	85	120	110	60	11	5	840	90	9	7.5	1.1
17-4486-1	10-01619	2"COMP 65 IRH	100	85	120	110	60	11	5	1010	100	9	7.5	1.1
17-4348-02	10-00067	3"COMP 55 IRH	146	146	182	182	76	13	7.5	2000	220	11	13	3.6
17-4348-00	10-00065	3"COMP 60 IRH	146	146	182	182	76	13	7.5	2500	280	11	13	3.6
17-4348-01	10-00066	3"COMP 65 IRH	146	146	182	182	76	13	7.5	3000	340	11	13	3.6

Spherilastik® Bearings

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



General guidance notes for selection:

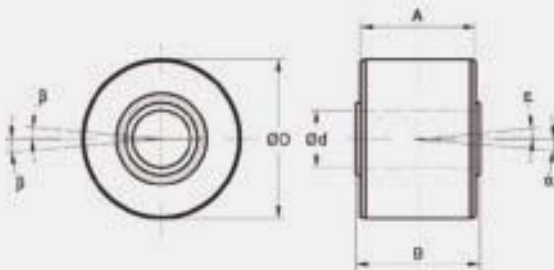
- Properties quoted for the components in this document relate to continuous steading loading or deformation conditions
- For continuous dynamic cyclic loading or deformation, the maximum values should be reduced to approximately 30% of the figures quoted, depending on frequency.
- For medium and low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

Typical Applications Include:

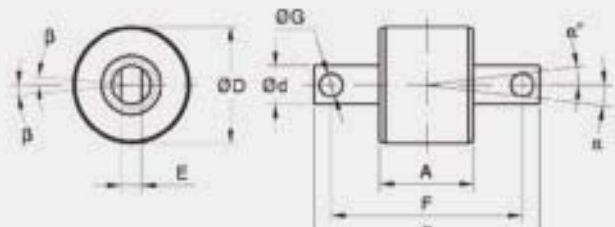
- Traction and braking reaction rods
- Hydraulic damper fixings

Technical Drawing

Sperilastik® bearings, centre bore type



Sperilastik® bearings, trunnion type



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)							RADIAL		AXIAL		TORSION		WEIGHT (kg)
			d	D	A	B	E	F	G	STIFFNESS (kN/mm)	MAX LOAD (kN)	STIFFNESS (kNm/rad)	±β (degrees)	STIFFNESS (kNm/rad)	±β (degrees)	
13-1316	10-00527	CENTRE BORE	25.4	66.7	47.6	54	-	-	-	70	34	0.9	8	0.9	6	0.84
13-2106-1	10-00291	CENTRE BORE	28.6	90.5	70	76.2	-	-	-	100	58	2.8	8	2.8	6	1.8
13-1006	10-00237	CENTRE BORE	28.6	90.5	70	76.2	-	-	-	93	58	2.8	8	2.8	6	2.5
13-1285	10-00255	CENTRE BORE	38.1	104.8	76.2	82.6	-	-	-	90	78	4.5	8	2.8	7	3.4
13-1180	10-01099	CENTRE BORE	44.5	127	101.6	104.8	-	-	-	87	93	6.8	7	6.2	7	6.4
13-4007	10-00273	CENTRE BORE	50.1	127	101.6	104.8	-	-	-	260	220	15	6	13	5	6.3
13-2202-1	10-00302	TRUNNION	35	66.7	47.6	120	20	90	13	70	34	0.7	8	0.9	6	1.2
13-2033	10-00283	TRUNNION	40	84	65	155	20	120	16.5	150	75	2.8	6	2.8	6	2.8
13-2568	10-02512	TRUNNION	50.5	104.8	76.2	170	30	130	20.8	220	150	4.5	8	7.5	7	4.8

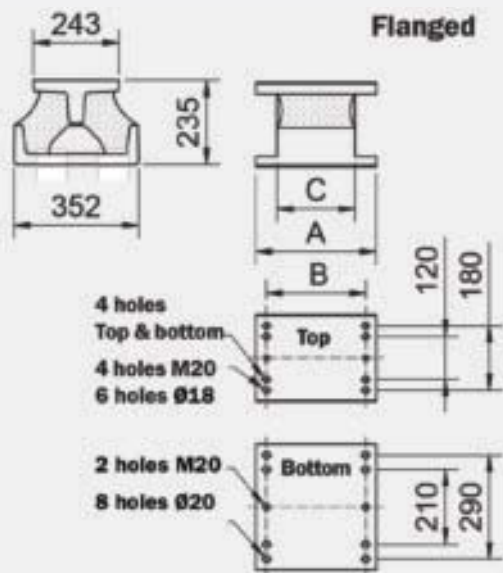
Super D

The "Super D" mounting range is designed primarily for heavy marine installations requiring increased shock capacity. These mountings operate at a nominal static deflection of 23 mm and can accommodate up to 50 mm shock excursions in any direction.

Buffer 15-3671 with low friction contact pad is often used with Super D mounts to limit movement under extreme shock forces, particularly as a non metallic rake and ramming stop, which is shown on the last page.



Technical Drawing



Product Data

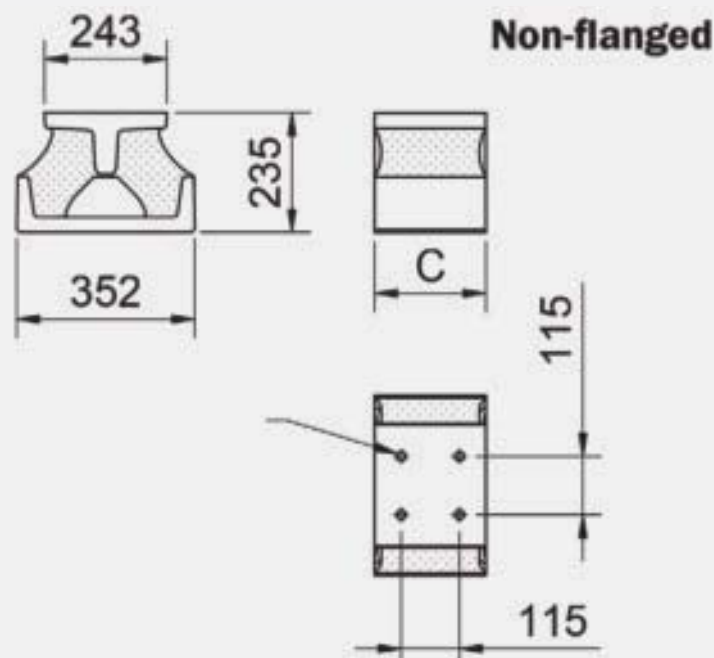
DRAWING No.	TYPE	DIMENSIONS (mm)			MAX LOAD (kN)	VERTICAL STIFFNESS (N/mm)	DYNAMIC VERTICAL STIFFNESS (N/mm)	WEIGHT (kg)
		A	B	C				
17-1736	FLANGED 45 IRH	340	280	220	14.2	620	710	65
	FLANGED 55 IRH				21	920	1160	
	FLANGED 65 IRH				31.5	1375	1965	
17-1737	FLANGED 45 IRH	410	350	290	19	835	960	81
	FLANGED 55 IRH				29.5	1275	1180	
	FLANGED 65 IRH				44	1960	2650	
17-1738	FLANGED 45 IRH	480	420	420	30.5	1325	1520	97
	FLANGED 55 IRH				45	1960	2450	
	FLANGED 65 IRH				67.8	2940	3975	

Nominal Stiffness Ratios

VERTICAL	LATERAL	LONGITUNDINAL
1	0.95	0.17

Super D Continued

Technical Drawing



Product Data

DRAWING No.	TYPE	DIMENSIONS (mm)			MAX LOAD (kg)	VERTICAL STIFFNESS (N/mm)	DYNAMIC VERTICAL STIFFNESS (N/mm)	WEIGHT (kg)
		A	B	C				
17-1661	NON-FLANGED 45 IRH	-	-	220	14.2	620	710	48.5
	NON-FLANGED 55 IRH				21	920	1160	
	NON-FLANGED 65 IRH				31.5	1375	1965	
17-1662	NON-FLANGED 45 IRH	-	-	290	19	835	960	64
	NON-FLANGED 55 IRH				29.5	1275	1180	
	NON-FLANGED 65 IRH				44	1960	2650	
17-1663	NON-FLANGED 45 IRH	-	-	360	30.5	1325	1520	80
	NON-FLANGED 55 IRH				45	1960	2450	
	NON-FLANGED 65 IRH				67.8	2940	3975	

Nominal Stiffness Ratios

VERTICAL	LATERAL	LONGITUNDINAL
1	1	0.22

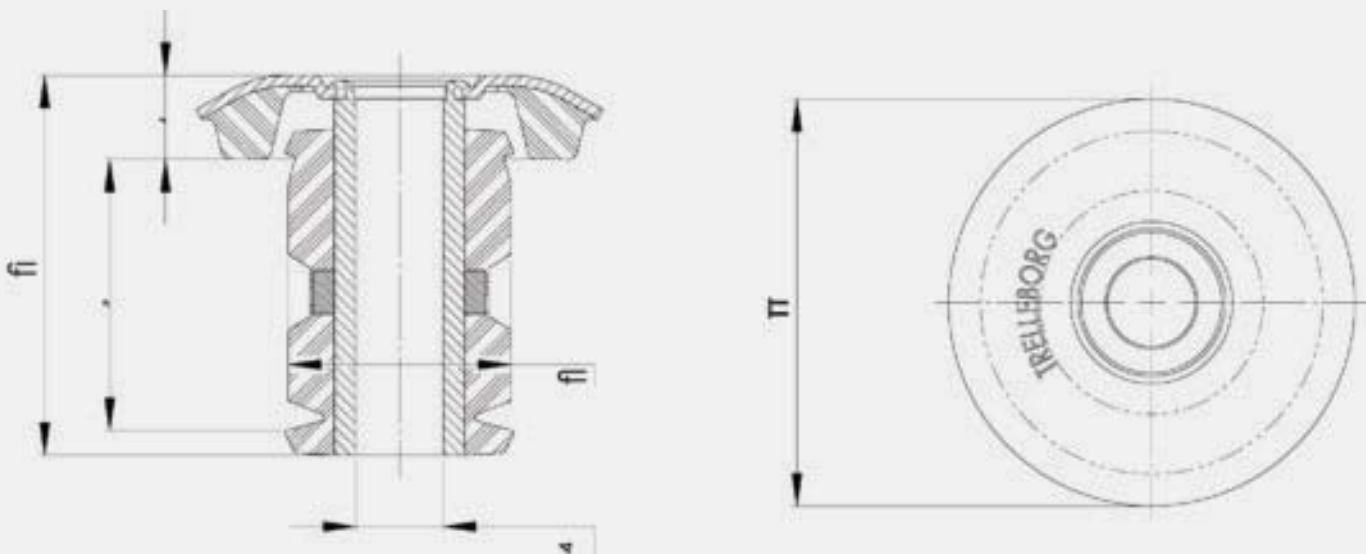
Tilt Cab Mount (TCM)

The Trelleborg Tilt Cab Mount (TCM) is specially designed for high levels of vibration isolation while simultaneously controlling axial movements with an integral buffer. The combination of isolator and buffer results in the mounting functioning with increased effectiveness over a conventional multi-mount system.

The robust and failsafe design enables suitability for ROPS and FOPS cab structures. The mount offers a load range from 180 to 380kg with a rising-rate stiffness characteristic to help limit motion and transmitted acceleration. It's simple press fit and tapered cap to allow cab/clevis to slip over mount without catching. The TCM also features a built-in vertical motion limiter to prevent excessive cab displacements during a shock input, a feature which also protects the bush from overload therefore ensuring long service life.



Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)						MAX LOAD (kg)	STIFFNESS (N/mm)		WEIGHT (kg)
			A	B (HOUSING)	C (HOUSING)	D	E	F		RADIAL	AXIAL	
10-04845	17-4455-1	50 IRH	70	38	50.5	16	75	15.5	180	3200	1580	0.11
10-02038	17-4455-1	60 IRH	70	38	50.5	16	75	15.5	290	5000	2500	0.11
10-04846	17-4455-1	70 IRH	70	38	50.5	16	75	15.5	380	7350	3670	0.11

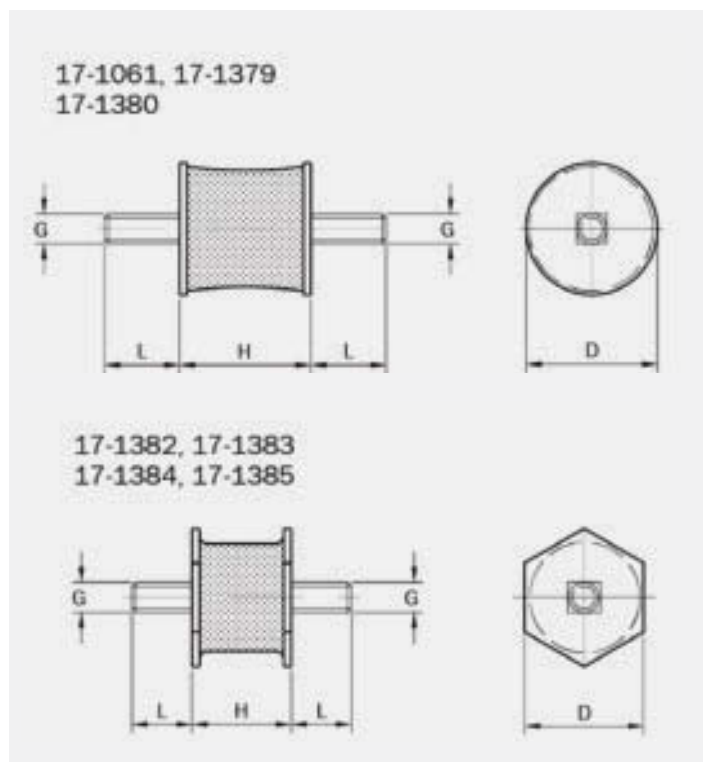
Two Bolt Instrumounting

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

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

Typical Applications:

- Instrument panels
- Electronic equipment
- Lightweight laboratory machines



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)				MAX LOAD (kg)		WEIGHT (kg)
			D	H	G	L	COMPRESSION	SHEAR	
17-1061	10-00443	45 IRH	11	11	M4	10	2,4	2,3	0.007
17-1061	10-00444	60 IRH	11	11	M4	10	4,8	2,5	0.007
17-1379	10-00470	45 IRH	21	22	M6	15	7,0	5	0.02
17-1379	10-00471	60 IRH	21	22	M6	15	14	5	0.02
17-1380	10-00472	45 IRH	35	34	M8	20	16	15	0.07
17-1380	10-00473	60 IRH	35	34	M8	20	32	15	0.07
17-1382	10-00476	45 IRH	15	16	M6	15	3,8	3	0.013
17-1382	10-00477	60 IRH	15	16	M6	15	7,6	3	0.013
17-1383	10-00478	45 IRH	21	19	M8	20	8,0	6	0.03
17-1383	10-00479	60 IRH	21	19	M8	20	16	6	0.03
17-1384	10-00480	45 IRH	32	26	M8	16	15	10	0.06
17-1384	10-00481	60 IRH	32	26	M8	16	30	10	0.06
17-1385	10-00482	45 IRH	33	22	M10	25	30	14	0.11
17-1385	10-00483	60 IRH	33	22	M10	25	60	14	0.11

UD Bush

Metalastik UD bush consists of two concentric sleeves with rubber securely bonded between them. Designed to accommodate torsional movements, axial and radial loads. The rubber is pre-stressed to give maximum dynamic strength and durability.

The bonded rubber takes up full movement. Therefore, lubrication or other bearing maintenance is not required. The bush has excellent sound and vibration isolation characteristics, enabling structures fitted with the sleeves to be silent and vibration free.

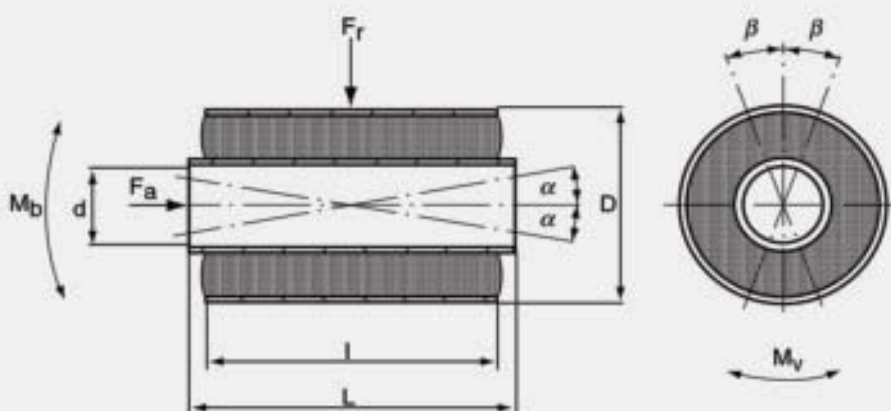
For vehicle suspension, pivot arms and all types of mechanical linkage, this mount permits oscillating movement through the deflection of rubber in shear. Suitable to replace roller bearings where small motions are required (up to 20 degrees). Reduces shock loads and noise transmission in structures.



Typical Applications Include:

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

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)				RADIAL		AXIAL		TORSION		WEIGHT (kg)
			d	D	l	L	STIFFNESS (N/mm)	MAX LOAD (N)	STIFFNESS (N/mm)	MAX DELF. (mm)	STIFFNESS (Nm/deg)	±β (degrees)	
13-1232	20-01612	60 IRH	8	20	15	17	2000	700	205	1.3	0.17	13	0.02
13-1230	10-00249	55 IRH	10	24	15	18	1360	500	170	1.7	0.24	13	0.02
13-1782	10-00277	60 IRH	12.7	38.2	25.4	31.8	788	1100	163	3.3	0.52	22	0.08
13-1657	10-00271	60 IRH	12.7	38.2	44.5	50.8	2100	2200	300	3.3	0.73	22	0.14
13-1004	10-00235	60 IRH	15.9	47.7	44.5	50.8	1981	2500	304	4.2	1.3	20	0.2
13-1698	10-00276	60 IRH	35	71.2	41.1	45	3800	4500	347	5.1	6.9	14	0.39
13-0785	10-00215	60 IRH	14.3	30.2	44.5	50.8	11000	6000	695	1.9	1.5	13	0.11
13-0797	10-00217	60 IRH	15.9	33.4	60.3	65	18800	9500	960	2.1	2.4	13	0.16

UH

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

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

When fitted with overload/rebound washers, a high strength fail-safe installation is provided.

Moreover, it is possible to alter the characteristics of the mounting by providing a dome-shaped washer at the upper rubber section. This will provide impact resistance to deflection beyond the permissible limit.

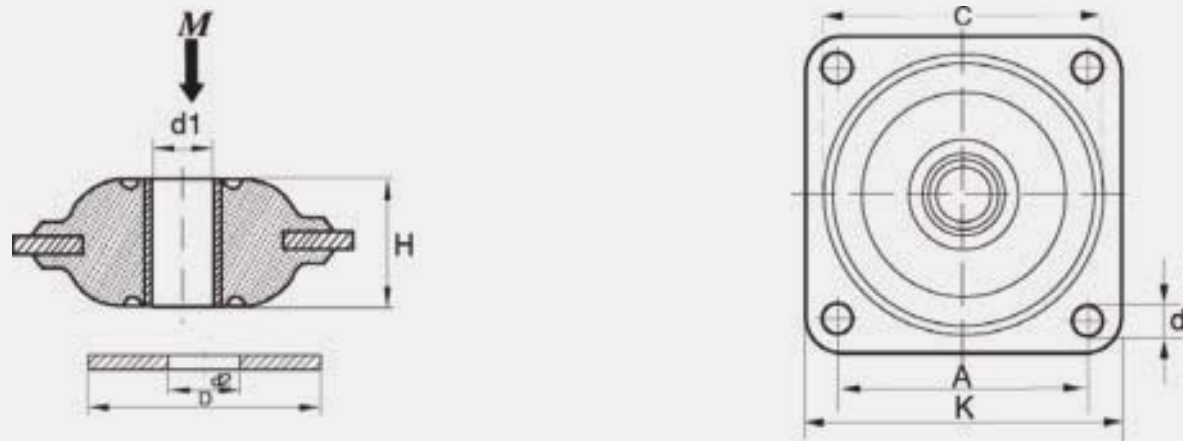
Effectively isolating vibration and noise, the UH® mounting also protects tanks and ancillary equipment against metal fatigue caused by chassis distortion.



Typical Applications Include:

- Tractors
- Excavators
- Compactors
- Lifting cranes
- Forklift trucks
- Forestry vehicles
- Off-road equipment

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)						MAX LOAD (kg)	MAX TORQUE (Nm)	WASHER PART No.	WEIGHT (kg)
			K	A	H	C	d	d1				
15-4131	10-00086	UH 50	100.5	80	37	91	10.5	15	250	80	20-00608	0.4
15-4132	10-00088	UH 70	100.5	80	37	91	10.5	17	400	120	20-00608	0.4

Vee Mount

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

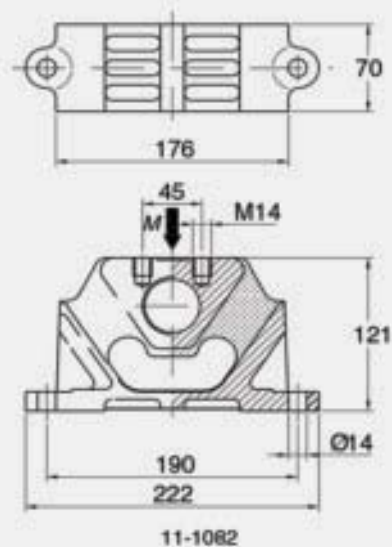
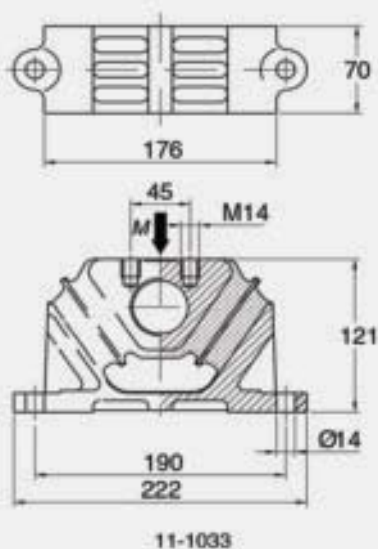
The Vee mount has the following features:

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



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

Technical Drawing



Product Data

DRAWING No.	PART No.	TYPE	MAX LOAD (kg)	WEIGHT (kg)
11-1082	10-00205	55 IRH	210	4.2
11-1082	10-00206	65 IRH	315	4.2
11-1033	10-00196	50 IRH	470	4.5
11-1033	10-00197	60 IRH	710	4.5

VT Mount

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

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

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

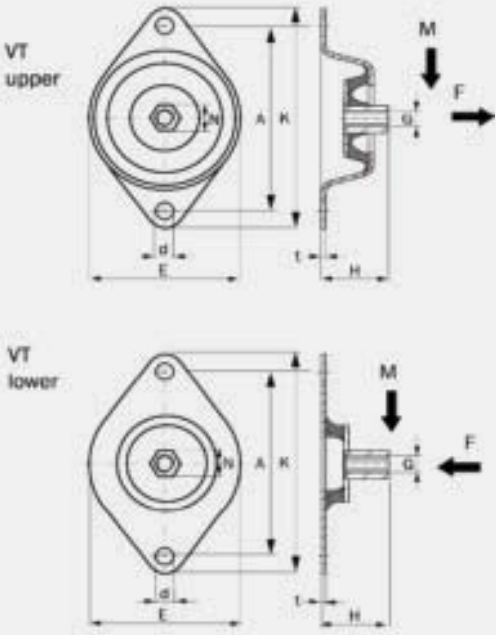
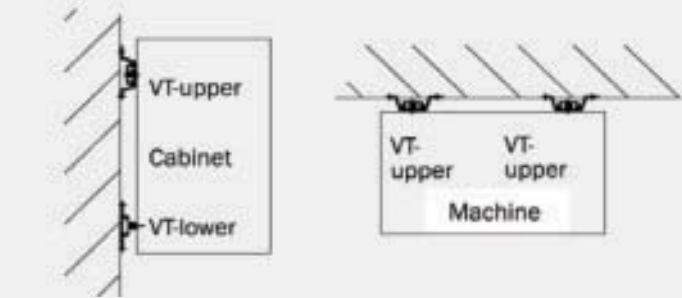
Typical Applications Include:

- Instrument cabinets
- Light machinery
- Fans
- Refrigeration units



Technical Drawing

Mounting instructions



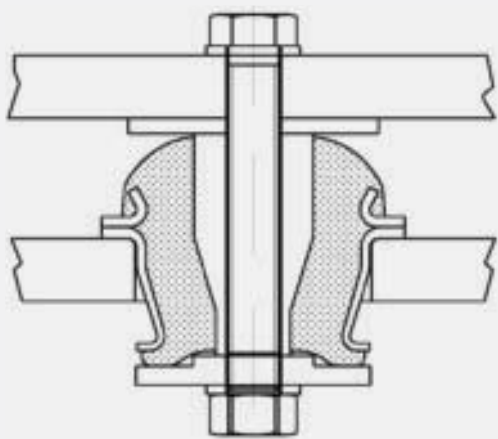
Product Data

DRAWING No.	PART No.	TYPE	DIMENSIONS (mm)								RADIAL MAX LOAD M (kg)	COMPRESSION MAX LOAD F (kg)	WEIGHT (kg)
			E	K	A	H	d	N	t	G			
17-4378	10-01369	VT UPPER 40 IRH	75	114	96	33	9	15	1.5	M8	14	30	0.146
17-4379	10-01370	VT UPPER 60 IRH									25	70	
17-4349	10-01373	VT LOWER 40 IRH	75	114	96	33	9	15	1.5	M8	14	30	0.104
17-4350	10-00015	VT LOWER 60 IRH									25	70	

Installation Guidelines

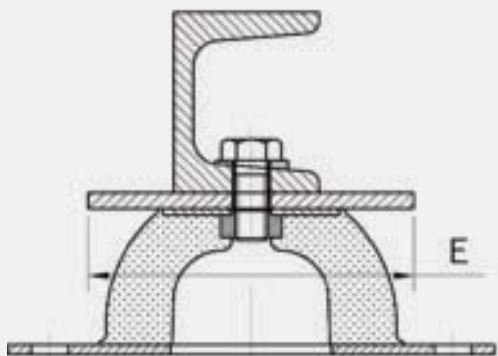
Metacone and HK

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



M Mounting

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



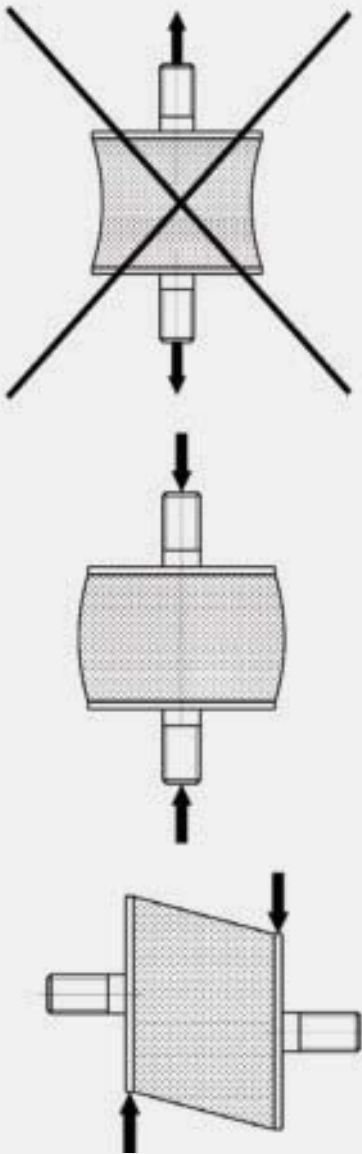
M MOUNTING	E (mm)
M7	43
M25	56
M50	76
M100	96
M200	101
M400	125
M600	165
M1500	260

Loading Directions

Do not install anti-vibration mountings in a way that causes the rubber to work in tension.

Compression and shear are the correct loading directions.

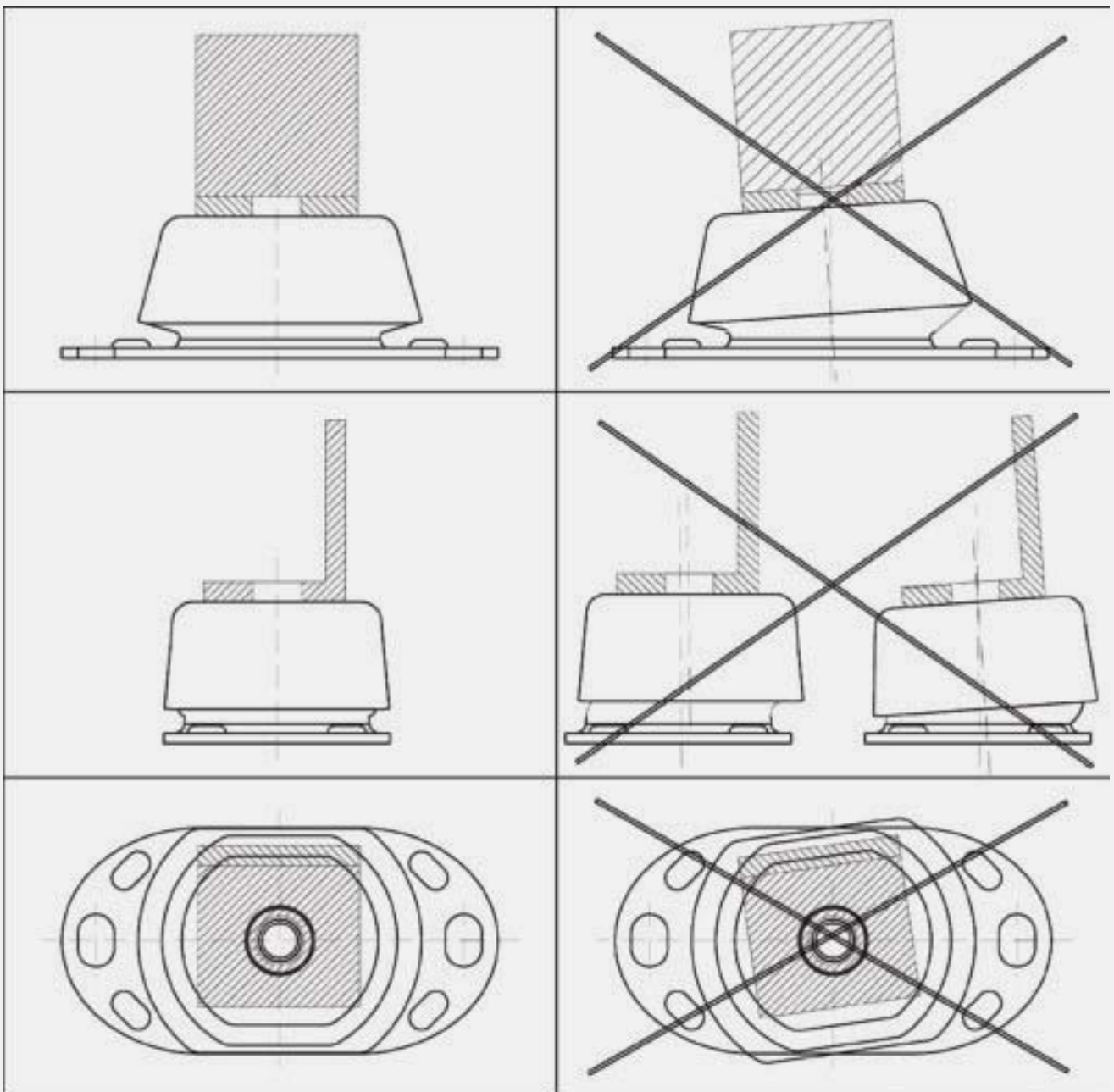
Take this into consideration for mounting types: Bobbins, M®, Two Bolt Instrumountings, Equi-Frequency, type SAW®, Rectangular SAW® and Circular SAW®.



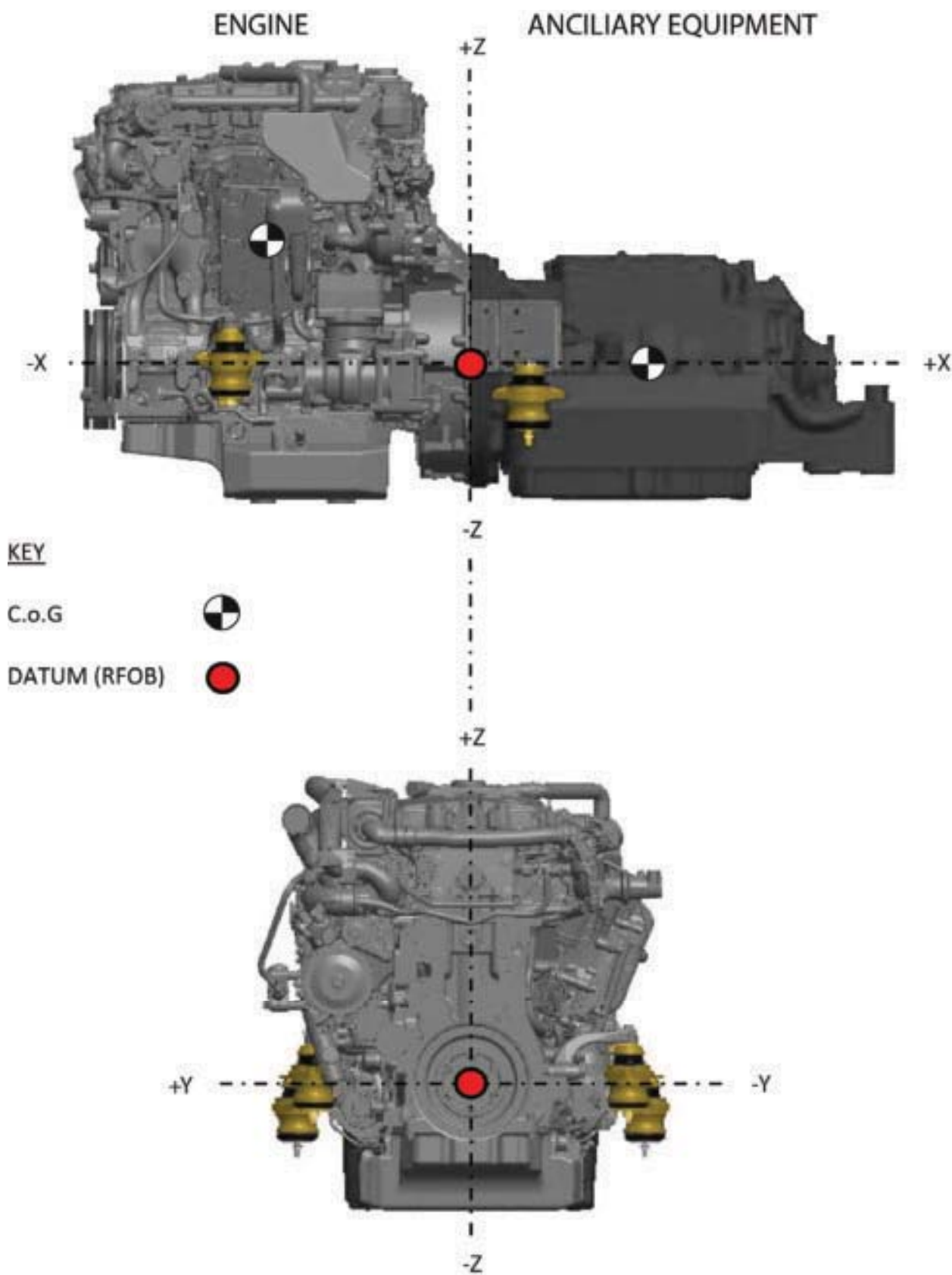
Alignment

Our mounts are designed to operate in compression and shear. Tensile loads should only be applied during shock / rebound conditions. Please ensure that (as illustrated below):

- During the initial installation the mounts are correctly loaded in accordance with the product rating, and that all interfaces above and below the mount are parallel within $\pm 0.5\text{mm}$ to prevent incorrect loading. Shims may be required to achieve this standard.
- The upper and lower fixings remain correctly aligned after tightening fixing bolts.
- All fixing nuts and bolts have washers and are securely tightened.



Layout Example



Application Questionnaire

CUSTOMER INFORMATION

Enquiry from	
Telephone No.	
Fax No.	
E-mail Address	
End User	

APPLICATION DETAILS

Application Description	
Mobile or Stationary	
Total Number of Installations	
Minimum temperature @ mountings (°C)	
Maximum temperature @ mountings (°C)	
Environmental Conditions	

ENGINE DETAILS

Manufacturer						
Model						
Weight (kg)						
Speed Range (rpm)						
No. of Cylinders						
Cylinder Configuration						
Mass Moments of Inertia (kg/mm ²)	Ixx		Iyy		Izz	
C.O.G from datum RFOB (mm)	X		Y		Z	
Block Sizes (mm)	X		Y		Z	

TRANSMISSION DETAILS

Manufacturer						
Model						
Weight (kg)						
No. of Cylinders						
Mass Moments of Inertia (kg/mm ²)	Ixx		Iyy		Izz	
C.O.G position from Datum (mm)	X		Y		Z	
Block Size (mm)	X		Y		Z	

MOUNT INFORMATION

Mount Number	Position from datum (RFOB)		
	X	Y	Z
1			
2			
3			
4			
5			
6			

FURTHER INFORMATION

Please supply a drawing of proposed layout.
 Have all suspended masses been detailed?
 Are there any mounting point restrictions?

Please fax, scan or post the completed questionnaire back to your sales contact or our technical centre. Contact details are available on the back cover of this catalogue.

Alternatively you can contact us via our website www.trelleborg.com/anti-vibration-solutions/contact or via our app MountFinder Pro.



Using advanced polymer technology, Trelleborg's industrial anti-vibration solutions (IAVS) operation specializes in the field of rubber-to-metal bonding for the removal of unwanted noise and vibration. Solutions include mountings, bearings and suspension. As part of the Trelleborg Industrial Solutions business area of Trelleborg Group, Trelleborg's Industrial AVS operation utilizes over 100 years of experience to provide solutions for numerous applications and environments, with a reputation of high quality, performance and service life. Markets include rail, marine, industrial and off-highway. The company focuses on isolation, attenuation and suspension solutions of unrivalled quality and reliability. The company's commitment and expert polymer technologies create maximum business value through improved longevity, productivity and cost effectiveness, while also optimizing comfort, health and safety. www.trelleborg.com/anti-vibration-solutions.

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