NEW TECHNOLOGIES

PAULSTRA

HUTCHINSON®
WORLDWIDE

NEW TECHNOLOGIES

CONTENTS

NEW TECHNOLOGIES

LAMINATED ASSEMBLIES

INTRODUCTION

Elastomers have two major properties:
- they are practically incompressible;
- when subject to shear, they have a very low modulus which means that they show small reactions for high amplitudes.

A laminated structured part, which consists of a series of layers of elastomer bonded to metal shims, affords characteristics which are determined by the elastomer shear along a plane parallel to the layers and by its compression along a plane perpendicular to the layers.

These assemblies may be flat, cylindrical, tapered or spherical. The definition of the elastomer layers (type and dimensions), is the result of optimization of the part on the basis of its actual specification requirements; operating conditions, loads, environment and service life.

FUNCTIONS AND ADVANTAGES

The shear and compression properties of elastomers enable laminated assemblies to be used as conventional bearings:

- immobilization and load bearing capacity in certain directions;
- capacity to move in directions perpendicular to the previous one.

The elasticity under compression of the laminated structure gives good load distribution and limits stresses due to an overload or impact (in the case of plain or spherical bearings, the load is limited by the contact pressure).

Alternating movements are for the most part composed of low amplitude cycles which are highly detrimental to mechanical bearings: localized wear and damage.
As the service life of elastomers depends on the movement amplitude, laminated assemblies have, conversely, a longer life for this type of cycling.
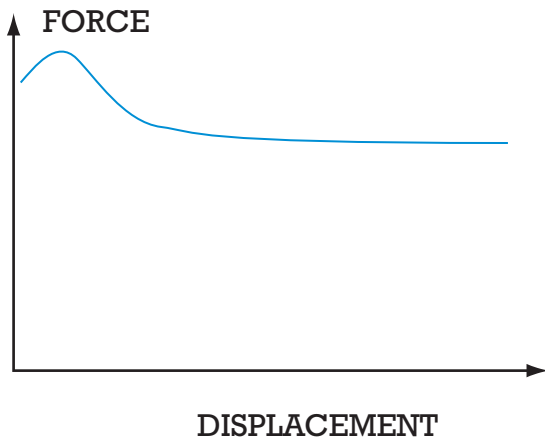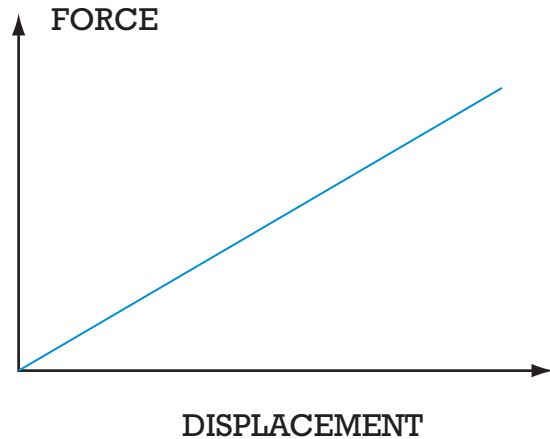

Fig. 1

Fig. 2

Fig. 1 shows the load/deflection curve for a conventional bearing; a greater force is necessary to start the movement and a constant force necessary to maintain this movement. These forces increase with the loads applied and the same opposing force must be applied to return to the initial position.

For an elastomer bearing (fig. 2), the force applied is proportional to the movement and is independant of the high static load applied. This results in an elastic deformation and enables the system to return to its initial position in the absence of any external stress.
This elasticity may be built-in to obtain spring-bearing functions, for example.

The advantages of laminated assemblies are numerous:

- **easier to fit** with much fewer parts and larger tolerances;
- **weight-saving** by comparison with the mechanical equivalent;
- **improved reliability** as sudden breakage is impossible;
- a laminated elastomer/metal assembly requires no lubrication and **less servicing** (no relative movement of parts, therefore no wear);
- a laminated assembly **absorbs noise and vibration**. It is also capable of withstanding high pressure differences and may therefore also **act as a seal**.

DESIGN AND DEVELOPMENT

The design of laminated assemblies is based largely on 3D finite element analysis methods.

Starting with a basic definition obtained by design guide, the part is modelized for finite element analysis: modelization from the geometry, and materials, the three dimensional stresses are determined.

The analysis reveals any deformation and the stress distribution at any point in the elastomer, the metal and also the interfaces (elastomer/metal).

Final optimization leads to improved stress distribution and therefore a longer service life. Finite element analysis also enables buckling behaviour simulations (high deformation) and solving of contact, friction, dynamic stress and fatigue resistance problems.
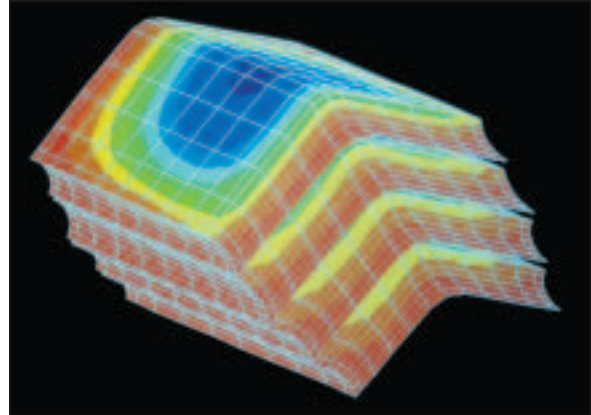
Around these laminated assemblies, PAULSTRA designs and develops complete and sophisticated systems, for example, vehicle suspensions.

The characteristics required are optimized (loads, deformation, service life, etc.) for the minimum dimensions and weight. All components must therefore be designed to work as well as possible under the permitted constraints.
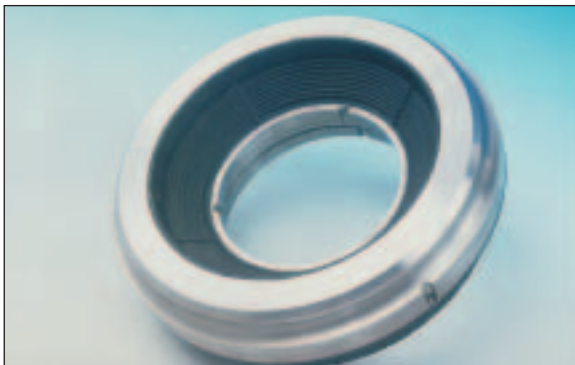
These assemblies are tested dynamically to simulate actual load, displacement and temperature conditions, etc. The fatigue behaviour of the assembly is thus assessed after several hundred thousand and even millions of cycles, in other words, its foreseeable service life; its characteristics (load and stiffness capability) are therefore continuously monitored before, during and after fatigue testing.

Other tests may be performed to determine the resistance of an assembly to a particular environment (sea water, radiation, etc.).

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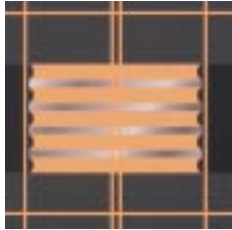
LAMINATED ASSEMBLIES

LAMINATED MOUNTINGS
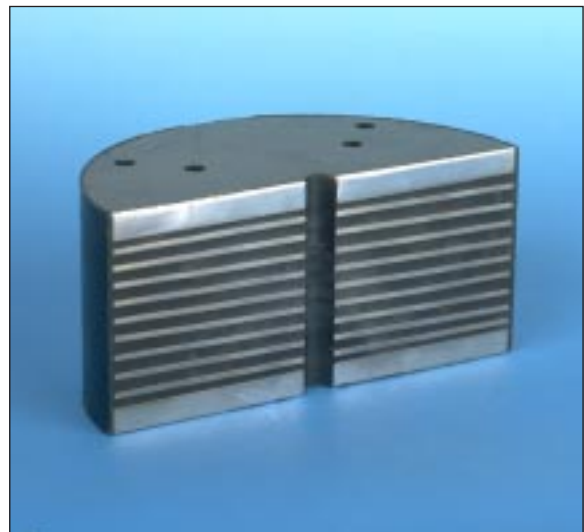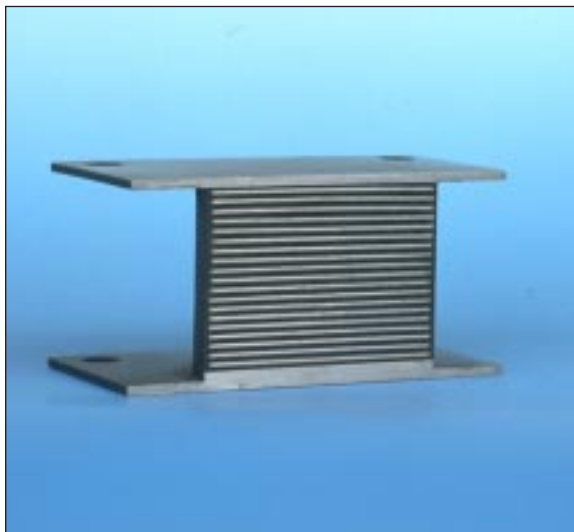
These assemblies can withstand high compression loads (along Oz): up to 1,000 tons/sq.meter.

They can absorb shear deformation (along Ox and Oy) of 50 to 100% of their height.

Cylindrical or annular type assemblies can also withstand torsional displacement around axis Oz.
In rotation around axes Oy and Ox, these mountings enable angular or low amplitude rotation errors (approximately 1°).

Applications:

- Seismic mountings.

- Helicopter engine suspension systems.

- Expansion joints.
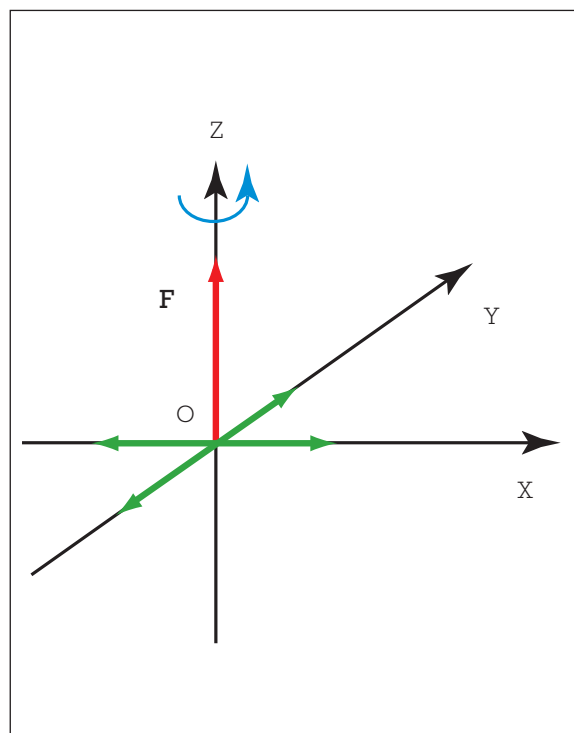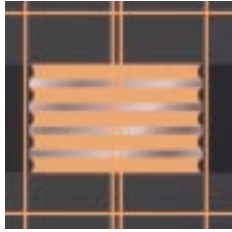
LAMINATED ASSEMBLIES

LAMINATED BEARINGS
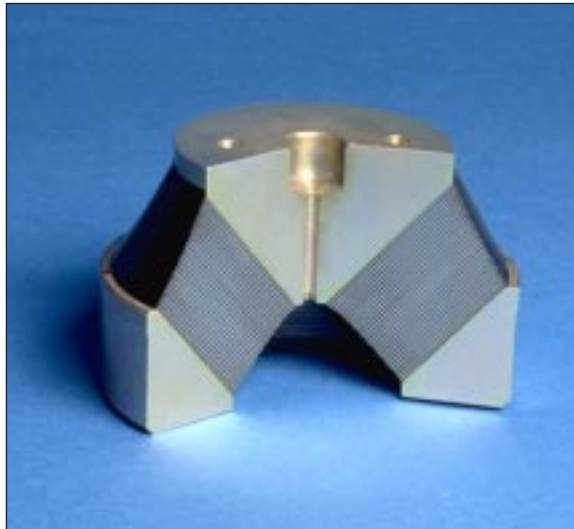
Fig. 1
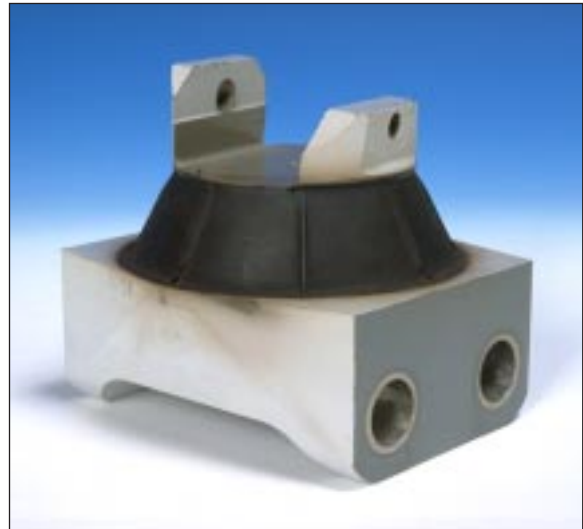
Fig. 2

Conical (fig. 1) or spherical (fig. 2) units are used to absorb very high axial loads of up to 150 tons.

Angular movement around an axis (Oz in the case of the conical bearing) or a centre of rotation (O in the case of the spherical bearing) are in the order of ± 10°.

Fig. 1

Fig. 2

Applications:

- Oil platform anchoring points.
- Helicopter rotor hub bearings.
- Piping swivel joints.
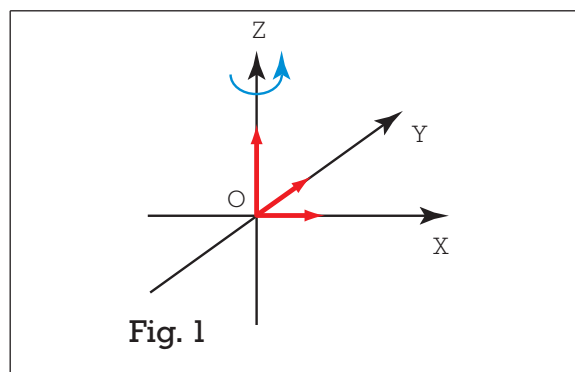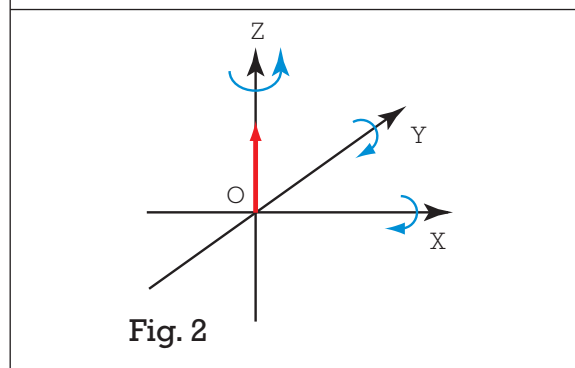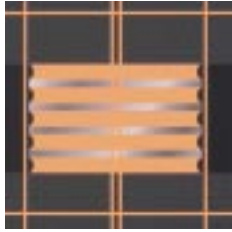
LAMINATED ASSEMBLIES

LAMINATED BUSHES
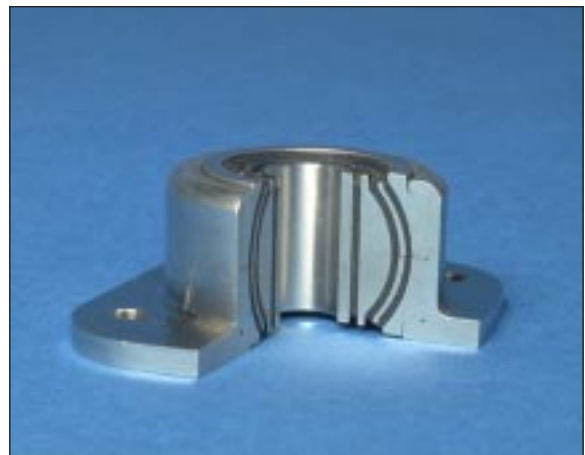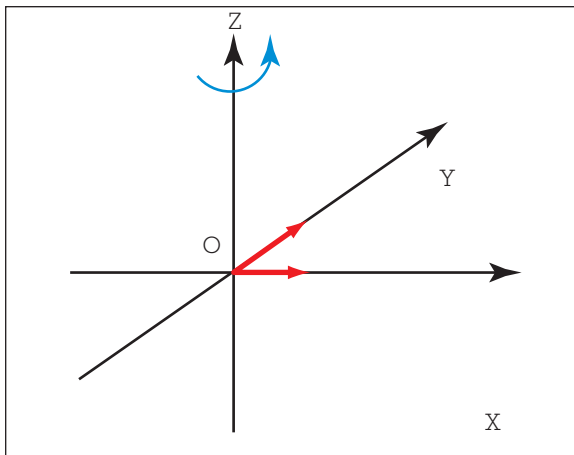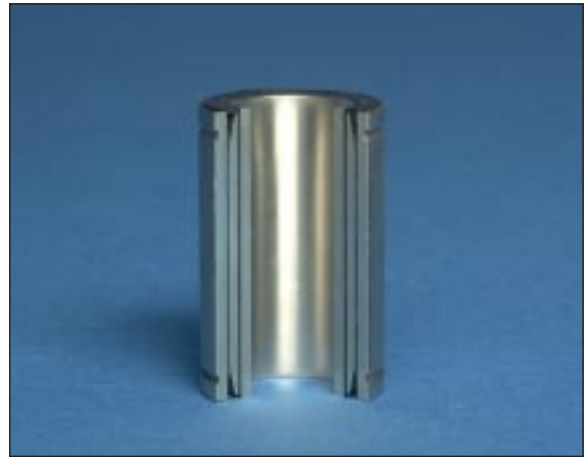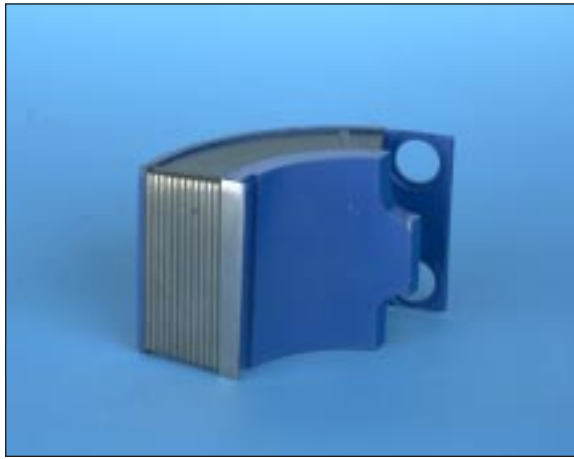
Laminated BUSHES use the same principle as other laminated bearings. Importance is primarily given to radial load capability along Ox and Oy which may be up to 100 tons.
Movement is allowed around an axis Oz or a centre of rotation O. Angular deflection is in the order of 30°.

Applications:

- Elastomer spring bearing assembly.
- Connecting rod pivot.
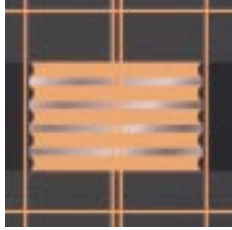
NAVY
SHOCK MOUNTINGS

INTRODUCTION

A shock mounting must fulfil the following functions:

- supporting the suspended mass when there is no shock while providing isolation from vibration and structure bourne noise;

- in case of shock: limit the force and/or movement to acceptable values;

- after shock: return the suspended mass to its initial position.

Schematically, there are two types of shock:

- An energy shock resulting from a falling mass for which the parameters taken into consideration are the incident kinetic energy and that restituted, the impact speed and the maximum forces and deflections.

- A shock resulting from a movement of the suspended mass. The parameters taken into consideration are the speed or acceleration of the assembly in time and also the forces relating to the maximum deflection.

ADVANTAGES

- The mountings described below are intrinsically stable under shock, that is to say, they enable the mass to return to its initial position; the system retains no plastic deformation nor residual buckling when the shock stresses are removed.

- The suspended mass may therefore undergo successive shocks with impunity. Nevertheless, the stability of the assembly in relation to the relative positions of the mountings and the centre of gravity of the suspended mass should be checked.

- PAULSTRA shock mountings are also exceptionally effective against vibration.

LOW DEFLECTION MOUNTINGS

FLEXIBLE MOUNTINGS FOR LOW LOADS MN 08 - MN 09 PAULSTRA RANGE

The main role of these mountings is to isolate vibration. A snubber system limits the movement of the suspended mass (10 mm), however the loads developed in this case, are high.
A wide load range from 5 to 320 N depending upon the application.

- Natural frequencies (vertical and lateral) under a nominal load of 5 to 8 Hz.

- B = unloaded.
- B - 6 mm height under nominal load (deformation under load . 6 mm).

- Maximum deflection from loaded position ± 10 mm in all directions (vertical and lateral).

- Stop at 10 mm deflection, maximum acceptable loads = 150 x nominal static load.
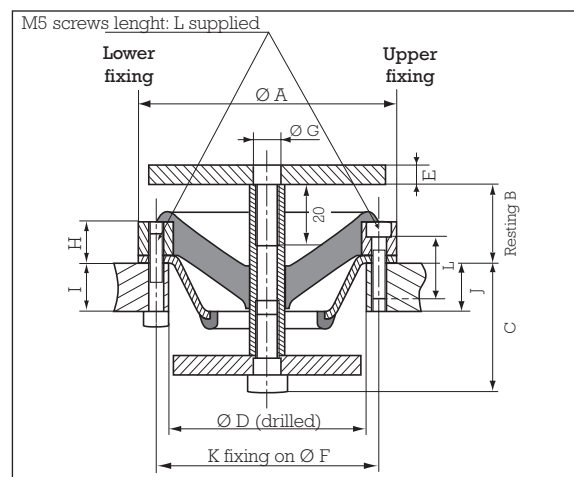
Nominal static load daN	PAULSTRA reference	Ø A mm	B mm	C mm	Ø D mm	E mm	Ø F mm	Ø G	H mm	I mm	J max. mm	K mm	L max. mm
0.5	552320 61/45	66	30	25.5	48	2.5	56	M6	12	8 10	15	3	20
1	552320 61/60	66	30	25.5	48	2.5	56	M6	12	8 10	15	3	20
2	552321 61/50	66	30	25.5	48	2.5	56	M6	12	8 10	15	3	20
4	539966 61/50	82	31.5	34.5	63	5	71	M8	13.5	6.5 11	20	3	20
8	539967 61/50	82	31.5	35.5	63	6	71	M8	13.5	6.5 11	20	3	20
16	539985 61/45	82	51	32	63	8	71	M12	33	10 15	20	4	40
24	539985 61/50	82	51	32	63	8	71	M12	33	10 15	20	4	40
32	539985 61/60	82	51	32	63	8	71	M12	33	10 15	20	4	40

1 kg . 1 daN

FLEXIBLE MOUNTINGS FOR HIGH LOADS MN 10 - MN 15
VIBRACHOC RANGE

A load range of between 20 to 5000 kg, depending on the mounting configuration and shock specification.
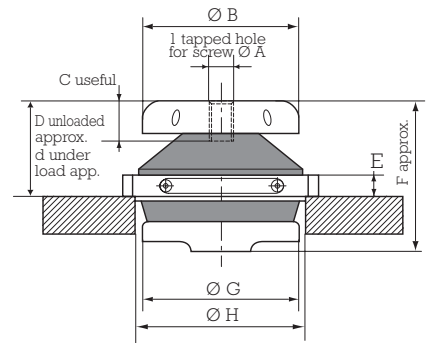
- Natural frequency (vertical) under a nominal load of 5 to 7 Hz.

- Natural frequency (lateral) under a nominal load of 3 to 6 Hz.

- B = Height unloaded

- Maximum deflection under nominal load ± 10 mm in all directions.

- Snubber at 10 mm deflection; maximum acceptable load: 30 g.

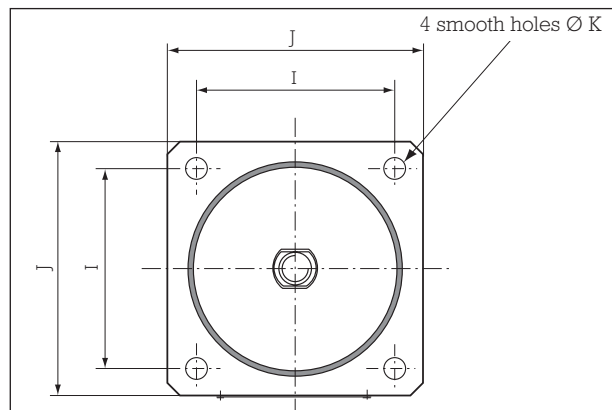| Nominal static load daN	VIBRACHOC reference	Ø A	Ø B mm	C (mm) useful length	D (mm) unloaded height	d (mm) height /u. load	E mm	F (mm) total height	Ø G mm	Ø H (mm) opening	I mm	J mm	K (mm) Ø screw hole
25	E1N-3391-16	M12	80	20	48 app.	39 app.	10	77 app.	80	87	78	100	8.5
42	E1N-3391-15	M12	80	20	48 app.	39 app.	10	77 app.	80	87	78	100	8.5
70	E1N-3391-14	M12	80	20	48 app.	39 app.	10	77 app.	80	87	78	100	8.5
115	E1N-3391-13	M20	110	30	79 app.	72 app.	15	109 app.	90	130	115	140	11
175	E1N-3391-12	M20	110	30	79 app.	72 app.	15	109 app.	90	130	115	140	11
240	E1N-3391-11	M20	110	30	79 app.	72 app.	15	109 app.	90	130	115	140	11
350	E1N-3391-10	M20	110	30	79 app.	72 app.	15	109 app.	90	130	115	140	11
410	E1N-3391-09	M33	200	49.5	130 app.	124 app.	20	173 app.	140	180	140	200	20
600	E1N-3391-08	M33	200	49.5	130 app.	124 app.	20	173 app.	140	180	140	200	20
1000	E1N-3391-05	M33	200	49.5	130 app.	124 app.	20	173 app.	140	180	140	200	20
1500	E1N-3391-03	M56	250	84	139 app.	131 app.	25	185 app.	180	220	195	250	30
2200	E1N-3391-02	M56	250	84	139 app.	131 app.	25	185 app.	180	220	195	250	30
3500	E1N-3391-01	M56	250	84	139 app.	131 app.	25	185 app.	180	220	195	250	30
5000	E1N-3391-17	M56	250	84	139 app.	131 app.	25	185 app.	180	220	195	250	30

1 kg . 1 daN

MEDIUM DEFLECTION MOUNTINGS

FEXIBLE MOUNTINGS FOR LOW LOADS MN 50
PAULSTRA RANGE

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

- Natural frequency (vertical and lateral) under load of 5 to 8 Hz.

- Maximum deflection under load:
  - vertical: ± 50 mm*,
  - lateral: ± 45 mm*.

* maximum forces corresponding to 10 times the load.

- H in rest position.
- H - 6 mm under nominal load (deflection under load = 6 mm).
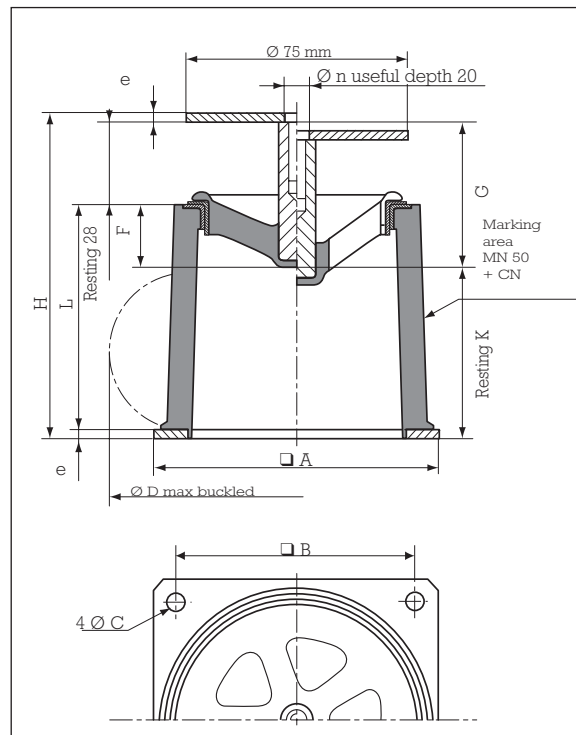
Nominal static load daN	PAULSTRA reference	❏ A mm	H mm	❏ B mm	e mm	Ø C mm	Ø n mm	F mm	G mm	Ø D mm	L mm	K mm
1	552301 61	90	109	75	2	5.5	8	19	47	105	77	60
2	552302 61	90	109	75	2	5.5	8	19	47	110	77	60
4	552303 61	95	110	80	3	5.5	8	21	49	120	76	58
8	552304 61	95	110	80	3	5.5	8	21	49	120	76	58
16	552305 61	105	129.5	90	5	6.5	12	39.5	67.5	125	91.5	57
24	552306 61	105	129.5	90	5	6.5	12	39.5	67.5	130	91.5	57
32	552307 61	105	129.5	90	5	6.5	12	39.5	67.5	135	91.5	57

l kg . l daN

FLEXIBLE MOUNTINGS FOR HIGH LOADS MN 45
VIBRACHOC RANGE

A load range of between 30 to 1,080 kg, depending on the different configuration and shock specification.

Deflections of 45 to 55 mm during shock reduce the transmitted accelerations.
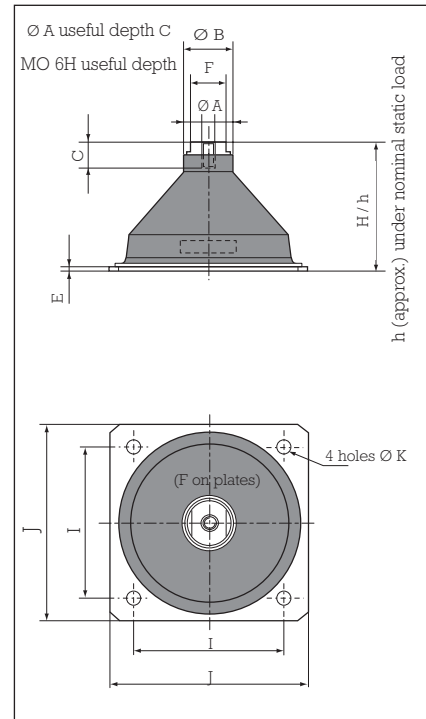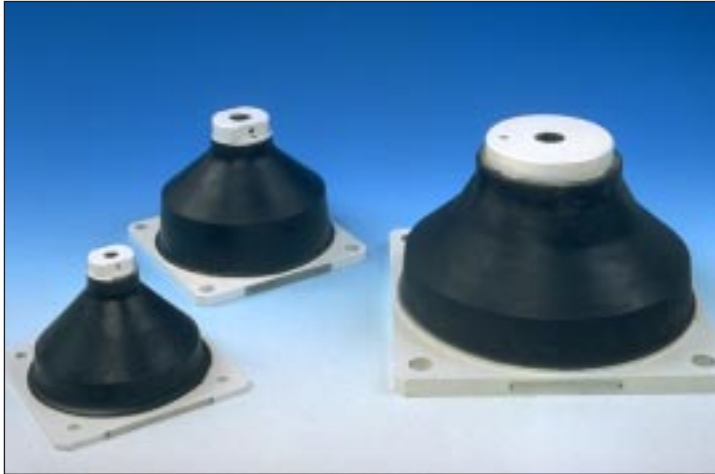
- Natural frequency (vertical and lateral) under load:
  4.5 to 5.5 Hz.

- Maximum deflection under load:
  ± 45 mm vertical *
  ± 45 mm lateral *

* maximum forces corresponding to 10 times the load.

Nominal static load daN	VIBRACHOC reference	Ø A	Ø B mm	C (mm) length useful	H (mm) unloaded height	h (mm) height under load	E mm	F mm	I mm	J mm	K (mm) Ø screw hole
30	E1N-3628-02	M10	37	20	100 approx.	89 app.	5	27	114	150	9
45	E1N-3628-01	M10	37	20	100 approx.	89 app.	5	27	114	150	9
60	E1N-3454-04	M10	37	20	100 approx.	89 app.	5	27	114	150	9
85	E1N-3454-03	M10	37	20	100 approx.	89 app.	5	27	114	150	9
110	E1N-3454-02	M10	37	20	100 approx.	89 app.	5	27	114	150	9
130	E1N-3454-01	M10	37	20	100 approx.	89 app.	5	27	114	150	9
160	E1N-3454-06	M10	37	20	100 approx.	89 app.	5	27	114	150	9
170	E1N-3455-04	M20	54	40	126 approx.	115 app.	10	41	140	165	13
230	E1N-3455-03	M20	54	40	126 approx.	115 app.	10	41	140	165	13
320	E1N-3455-02	M20	54	40	126 approx.	115 app.	10	41	140	165	13
425	E1N-3455-01	M20	54	40	126 approx.	115 app.	10	41	140	165	13
500	E1N-3456-04	M24	116	48	154 approx.	141 app.	15	41	140	250	18
625	E1N-3456-03	M24	116	48	154 approx.	141 app.	15	41	210	250	18
800	E1N-3456-02	M24	116	48	154 approx.	141 app.	15	41	210	250	18
1080	E1N-3456-01	M24	116	48	154 approx.	141 app.	15	41	210	250	18

1 kg . 1 daN

LARGE DEFLECTION MOUNTINGS

## FLEXIBLE MOUNTINGS FOR LOW LOADS MN 75 COMPOSITE PAULSTRA RANGE

These mountings were developed to handle small loads under large deflection (75 mm) and provide a low vibration transmission over a wide frequency range (up to 500 Hz).
The system developed provides this dual function effectively and without compromise.

The originality of this patented system, using new materials for this type of application has, in particular, enabled a reduction in size while increasing reliability (fatigue, shock resistance).
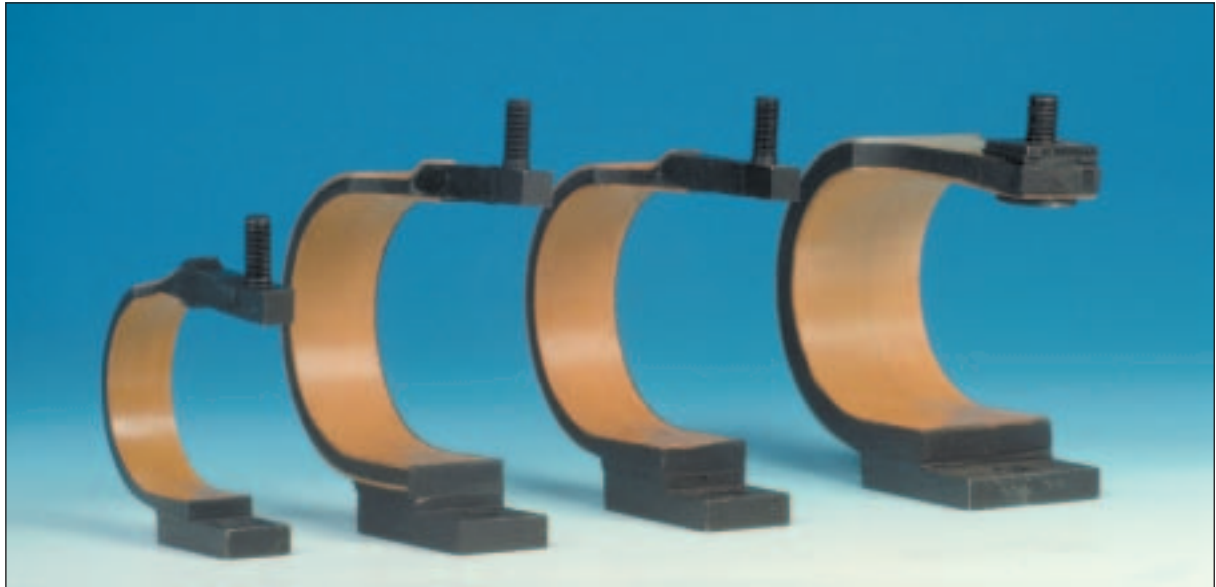
- natural frequency = 5 Hz under nominal load;
- maximum deflection = 75 mm in all directions;
- limit stop at 75 mm in the static load direction;
- no limit stop in other directions;
- maximum load under impact 75 mm = 15 G.

H0 = unloaded
D1 = Deformation under load
H = Height under load

Nominal load daN	PAULSTRA Reference	Axial stiffness (daN/mm)	H0 mm	D1 mm
1.5	553010 61	0.17	115	9
2.5	553011 61	0.25	115	10
5	553012 61	0.5	131	10
8	553013 61	0.8	131	10
16	553014 61	1.6	144	10
24	553015 61	2.4	144	10
32	553016 61	3.2	155	10

l kg . l daN

FLEXIBLE MOUNTINGS FOR HIGH LOADS MN 75 ELASTOMER VIBRACHOC RANGE

Elastomer isolators designed for acoustic isolation and shock protection
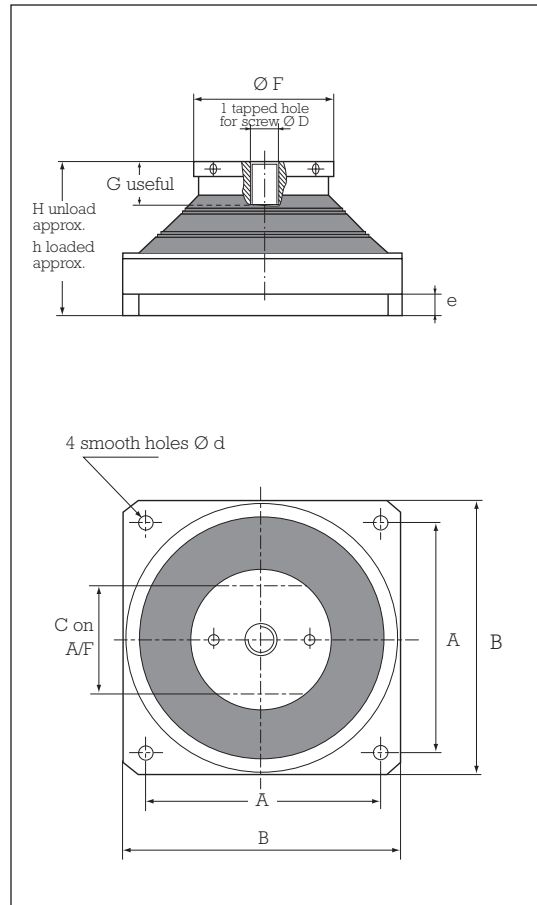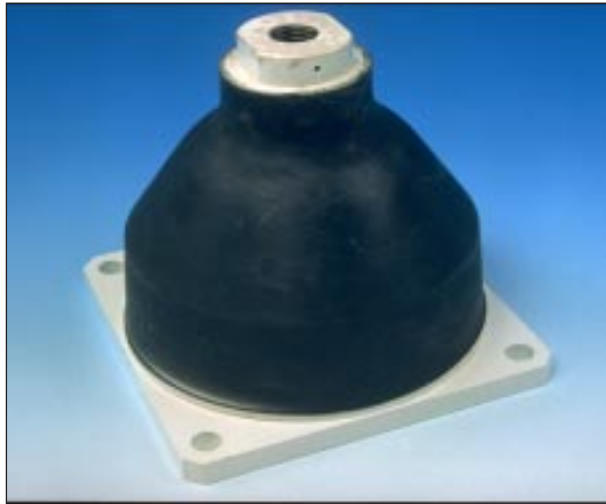
- Natural frequency (vertical and lateral) under nominal load: 4 to 5.5 Hz.

- Maximum displacement under shock: 75 mm all in directions.

- Mechanical strength: 30 g.

| Nominal load daN	VIBRACHOC reference	Ø D	Ø F mm	G (mm) length useful	e mm	H (mm) unloaded	h (mm) under load	A mm	B mm	d (mm) Ø screw hole	C mm
120	E1N-3392-10	M30	92	45	15	211 approx.	197 approx.	200	236	18	60
200	E1N-3392-09	M30	92	45	15	211 approx.	197 approx.	200	236	18	60
250	E1N-3392-08	M30	108	45	15	211 approx.	197 approx.	234	270	18	60
380	E1N-3392-07	M30	112	45	15	211 approx.	197 approx.	234	270	18	60
630	E1N-3392-06	M56	199	84	40	255 approx.	238 approx.	360	446.5	30	
900	E1N-3391-05	M56	199	84	40	255 approx.	238 approx.	360	446.5	30	
1200	E1N-3392-04	M56	240	84	40	255 approx.	238 approx.	360	446.5	30	
2000	E1N-3392-03	M56	240	84	40	255 approx.	238 approx.	360	446.5	30	
3000	E1N-3392-02	M56	240	84	40	255 approx.	238 approx.	360	446.5	30	
4000	E1N-3392-01	M56	280	84	40	305 approx.	289 approx.	460	546.5	30	

1 kg . 1 daN

PIPE ISOLATORS

VIBRACHOC range

Flexible support ring maintaining the link between pipe and structure providing vibration isolation and protection against shock.

- Natural frequencies under nominal load :
  - axial :   10 to 30 Hz,
  - radial :   15 to 40 Hz.

- Maximum displacement in axial shock : ± 5 mm.

- Temperature range : 0 to 175° C.

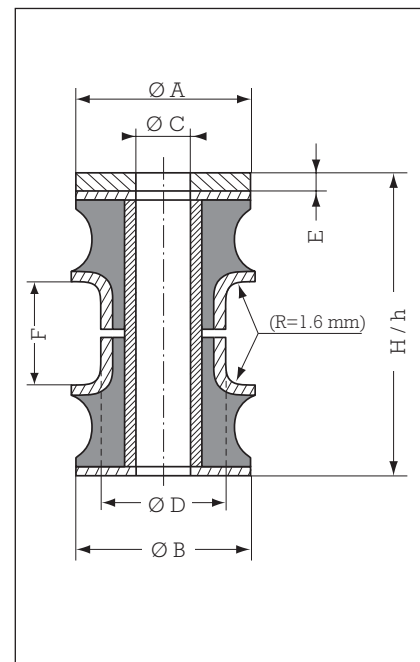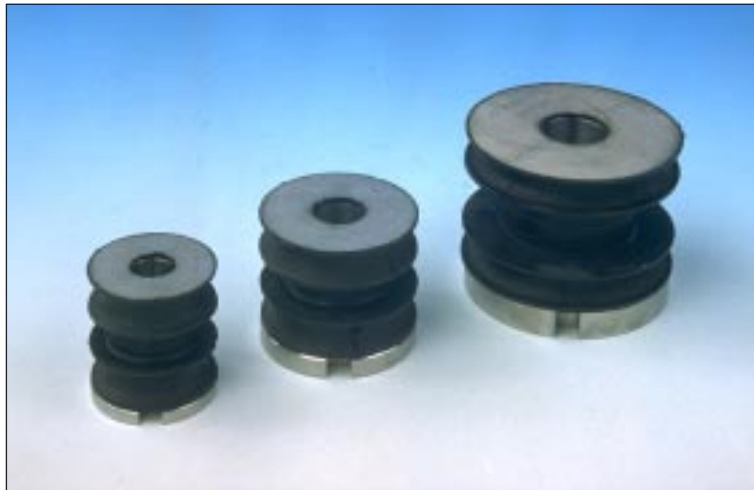| Nominal load daN	VIBRACHOC reference	A mm	B mm	Ø C mm	Ø D mm	E mm
0.54	E1M-3703-01	19.7	65	36	10.3	36
0.54	E1M-3704-01	19.7	65	36	10.3	36
0.92	E1M-3699-01	19.7	70	42	14	39.5
1.7	E1M-3705-01	24.7	80	50	17.15	39.5
1.7	E1M-3706-01	24.7	80	50	21.3	47.5
2.58	E1M-3707-01	24.7	88	55	26.9	60
4.44	E1M-3708-01	29.7	96	60	30	63
4.44	E1M-3709-01	29.7	105	66	33.7	71
4.44	E1M-3710-01	29.7	105	66	36	71
6.4	E1M-3711-01	29.7	120	73	42.4	77.5
8	E1M-3712-01	34.7	120	80	48.3	83.5
12.6	E1M-3713-01	34.7	90	100	57	98
12.6	E1M-3714-01	34.7	90	100	66.3	98
20	E1M-3336-10	39.7	110	115	66	111
20	E1M-3715-01	39.7	110	121	73	125
20	E1M-3716-01	39.7	110	121	76.1	125
32	E1M-3467-11	39.7	140	141	88.9	134
48	E1M-3717-01	44.7	140	171	114.3	165
68	E1M-3718-01	44.7	141	191	141.3	193
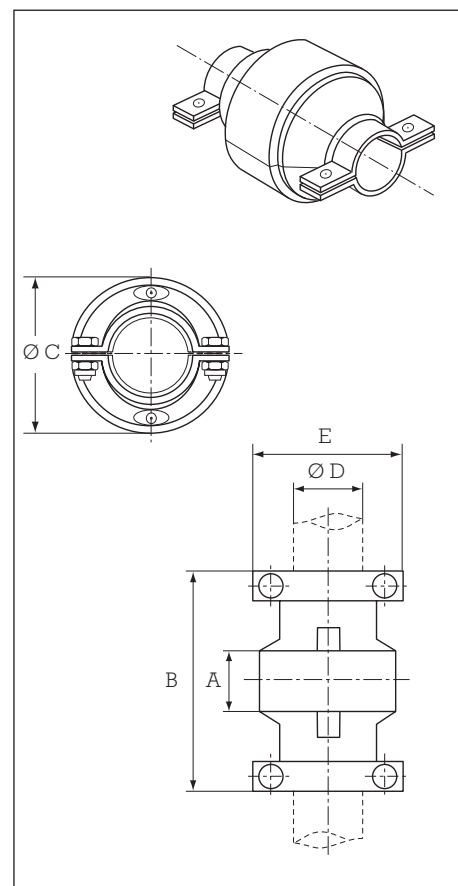
DECOUPLING WASHERS

VIBRACHOC RANGE

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

A decoupling washer is composed of:

- 2 bonded elastomer washers;
- 1 stainless steel anti-shock washer;
- 1 stainless steel preload spacer.

- Natural frequencies (vertical and axial) 15 to 20 Hz depending on load.

- Maximum deflection under shock:
  - axial: 8 m,
  - radial: 5 mm.

- Mechanical strength corresponding to 30 times the nominal load.

Nominal load daN	VIBRACHOC reference	Ø A mm	Ø B mm	Ø C mm	Ø D mm	E mm	F mm	H (mm) unloaded	h (mm) under load
14	E1RP-3804-01	Square 28x28							
18	E1RP-3804-02	28	28	8.2	20	2.5	10	42.5 approx.	35.5 approx.
27	E1RP-3805-01	28	28	8.2	20	2.5	10	42.5 approx.	35.5 approx.
40	E1RP-3806-01	42.5	42.5	14.2	29	5	15	50 approx.	44 approx.
60	E1RP-3806-02	42.5	42.5	14.2	29	5	15	50 approx.	44 approx.
85	E1RP-3806-03	42.5	42.5	14.2	29	5	15	50 approx.	44 approx.
125	E1RP-3807-01	56	56	18.2	35	8	15	53 approx.	47 approx.
140	E1RP-3807-02	56	56	18.2	35	8	15	53 approx.	47 approx.
185	E1RP-3807-03	56	56	18.2	35	8	15	53 approx.	47 approx.
260	E1RP-3808-01	78	80	24.5	50	12	25	67 approx.	60.5 approx.
320	E1RP-3808-02	78	80	24.5	50	12	25	67 approx.	60.5 approx.
380	E1RP-3808-03	78	80	24.5	50	12	25	67 approx.	60.5 approx.
520	E1RP-3809-01	88	90	27.5	53	16	25	71 approx.	64.5 approx.

1 kg . 1 daN
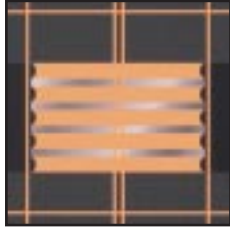
"STRAFLUID"
HYDRAULIC MOUNTINGS

INTRODUCTION

The progress in motor vehicle design and increased demand for comfort both in terms of vibration and sound-proofing has resulted in increasingly demanding specifications for suspension systems.

PAULSTRA hydraulic mountings use an elastomer support device combined with an hydraulic system. The hydraulic system acts differentially and specifically in relation to the frequency range and the type of vibrational excitation incurred.

These mountings, due to a total integration of all components, are still compatible with standard sizes and are as easy to fit as conventional mountings.

ADVANTAGES

Ordinary elastomer suspensions are subject to dynamic stiffening phenomena as the vibration frequency increases and amplitude decreases. Conventional elastomer mountings offer low stiffness and low damping to filter higher frequency vibrations, this leads to height and disturbing amplitude at resonance.

A hydraulic suspension can at the same time provide a low frequency damping function and a high frequency acoustic filtering (100 - 200 Hz).
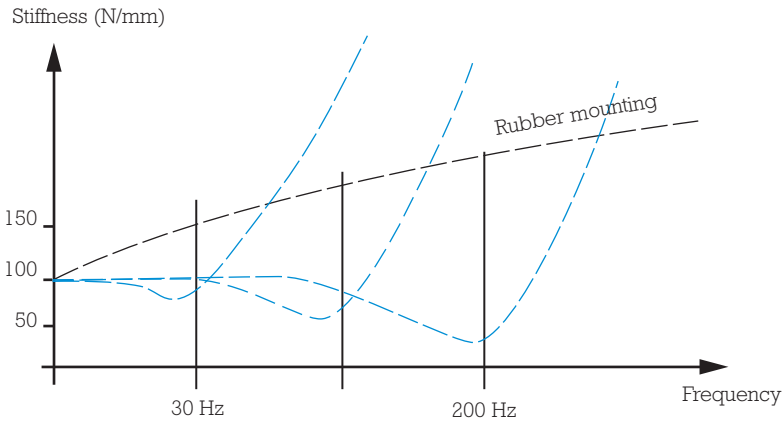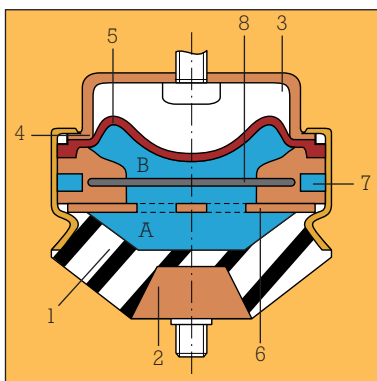

Acoustic filtering
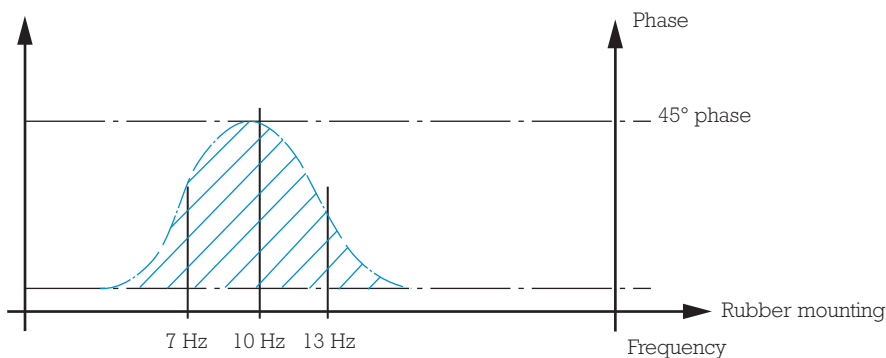
Damping

OPERATION

Definition of the structure is complex and uses the finite element calculation method. This determines the stiffness, damping and foreseeable failure and fatigue points. Special three-dimensional calculation software is used to study the behaviour of the mountings under major deformation and complex loads.

1- ELASTOMER MOUNTING
2- CORE
3- FIXING
4- CRIMPED CASING
5- SEALING MEMBRANE
A-
B- } CHAMBERS (HYDRAULIC FLUID)
6- SEPARATION (7 + 8)
7- PASSAGE (A-B)
8- HIGH FREQUENCY SOFTENING
   CONTROL WASHER
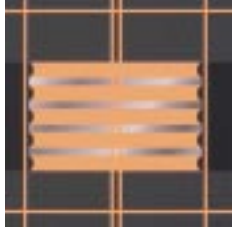
ACTIVE ISOLATION

INTRODUCTION

Since 1988, PAULSTRA has designed and developed active isolation systems. These systems are an extension of the PAUSTRA/VIBRACHOC range of product with high efficiency at low frequencies.

Active control combines our knowledge in vibration control to the efficiency of electronic systems.

AVDANTAGES

- To improve dynamic isolation offered by passive suspensions of the same stiffness.

- To improve uncoupling between structures.

- To simplify the installation of the equipment by reducing or eliminating inertia blocks.

- To reduce structural stress and increase life.

- To reduce noise.

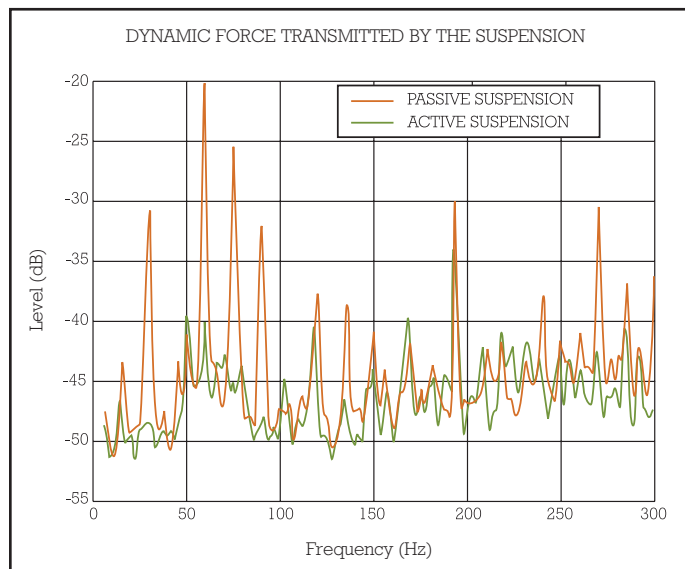- To reduce movement of connections to equipment.

OPERATING PRINCIPLE
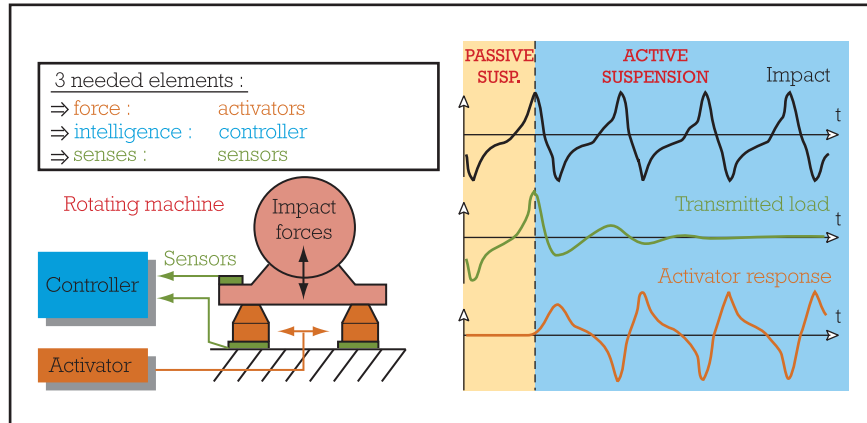
RESULTS

This graph shows comparison between a machine fitted on a passive suspension (red curve) and an active suspension (green curve)
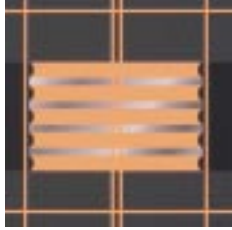
It clearly shows that active control significantly reduces the levels of the loads transmitted to the structure.

EXAMPLE

3 axis active suspension

ANTI-VIBRATION MOUNTINGS FOR AVIONICS AND ELECTRONICS


INTRODUCTION

PAULSTRA has developed a wide range of multi-directional mountings specially suitable for aeronautic and electronic requirements.

Models are available in different elastomers: silicon, fireproofed silicon, fluorosilicon or neoprene, to meet the requirements of the main aeronautics standards (FAR 25 - AIR 7304 - MIL STD 810 - C 172 C - MAR 508 s.o.).

Covering a natural frequency range of 15 to 50 Hz, their applications range from vibration isolation to shock-protection of electronic apparatus and also aircraft fuselage and helicopter cockpit mountings.
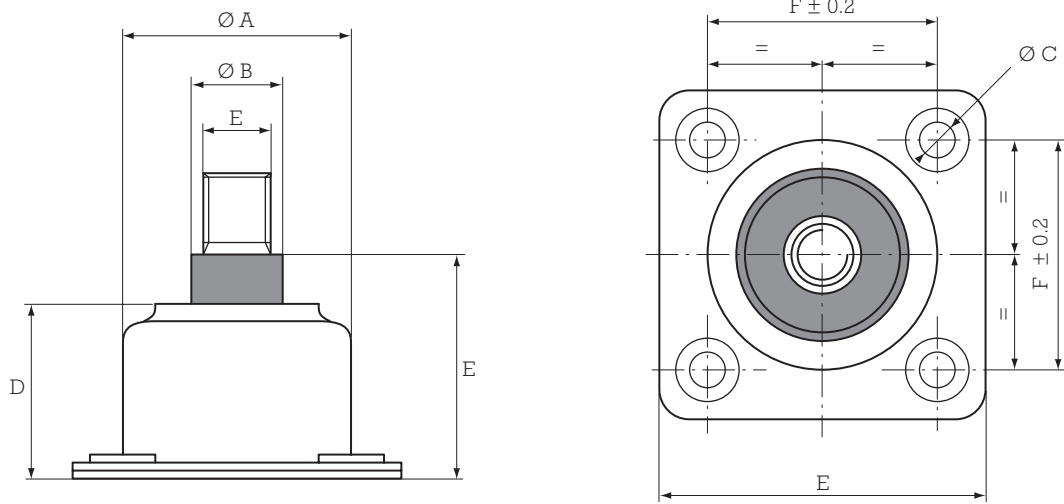
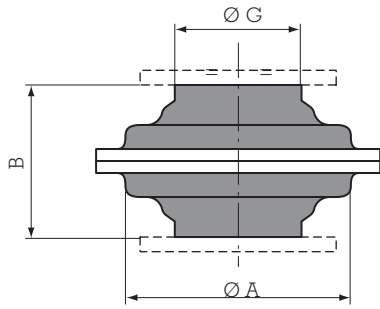| PAULSTRA reference	Ø A mm	Ø B mm	Ø C mm	D mm	E mm	F mm	G mm	M	Wght Kg	Loads daN Max	Loads daN Min
906009	28	12	3.5	22.6	13	25.4	34	*	0.05	5	3
906011	38	12	3.5	30	13	34.9	43.5	*	0.10	8	4
539860	50	15	6.5	36	44	49.2	64	M 12	0.25	20	10
539864	92	30	12.5	63	77	88	114	M 24	1.5	40	20

* on these two types, the thread is replaced by a bore of 5.2   **l kg . l daN**
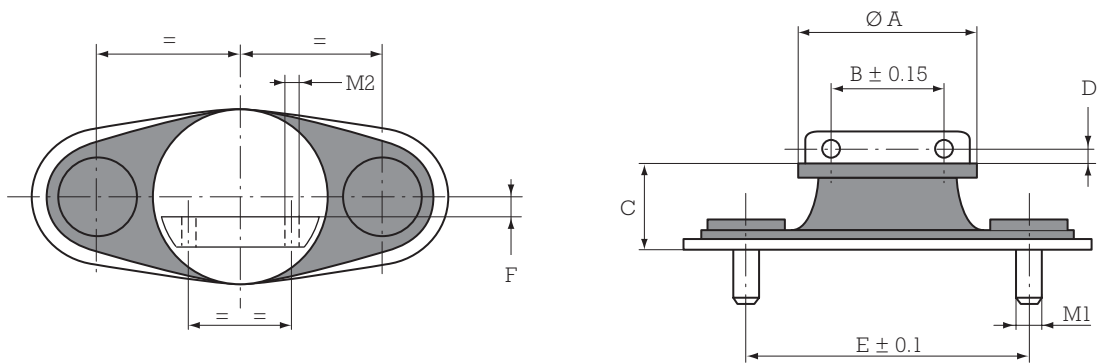
PAULSTRA reference	Ø A mm	B mm	C mm	D mm	E mm	F mm	M1 mm	M2 mm	Wght Kg	Loads daN Max	Loads daN Min
596530	15	9.5	6	2.2	24	1.3	2.5	2	8	0.1	0.05
596494	20	13	8	2.2	30	1.3	2.5	2	10	0.2	0.1
596431	20	13	8	2.2	30	1.3	2.5	2	10	1	0.5

l kg . l daN

PAULSTRA reference	Ø A mm	B mm	C mm	D mm	E mm	F mm	Ø G mm	Wght g	Loads daN Max	Loads daN Min
539848	27	18	5.2	25.4	3.5	34	15	12	4	1
539858	37	25	5.2	34.9	4.2	46.5	21	30	16	4
539859	49	32	8.5	45.5	6.2	57.5	27	60	25	8

l kg . l daN
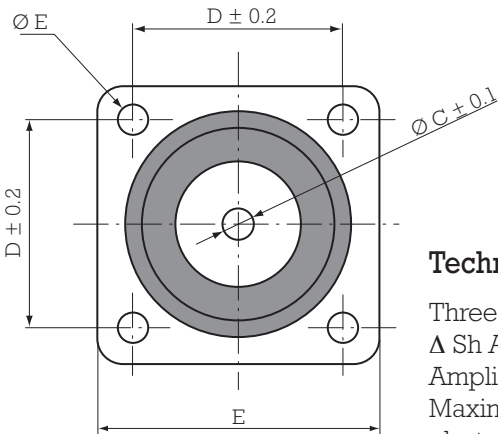
Technical specifications

Three-directional natural frequency: 15 to 50 Hertz depending Δ Sh A and loads.
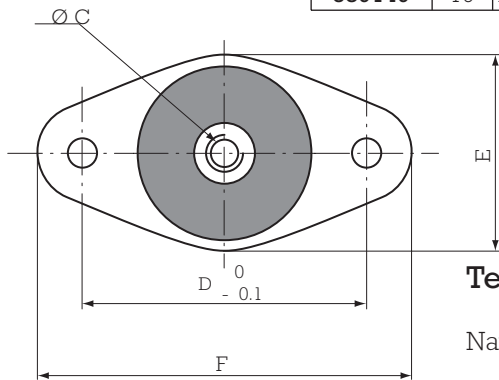
Amplification at resonance: SILICON . 3, NEOPRENE . 9.

Maximum excitation amplitude ± 0.5 to 1.25 mm depending on elastomer.

Structural strength shock: 30 g 11 ms 1/2 sine.
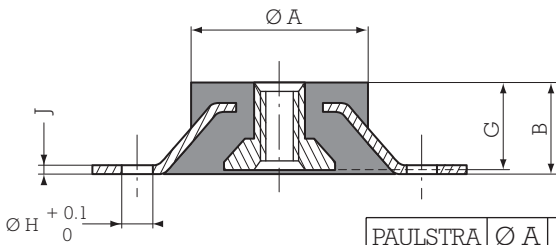
PAULSTRA reference	Ø A mm	B mm	Ø C	D mm	E mm	F mm	G mm	H mm	Wght g	Loads daN Maxi	Loads daN Min
539143	19	6.1	*1640-32 UNJC or *1900-32 UNJC	31	22	41	5.5	1	5	20	5
539144	19	6.1		31	22	41	5.5	1	5	20	5
539148	19	9.25		31	22	41	8.45	1	7.5	20	5
539149	19	13.7		31	22	41	9.25	1	8.5	20	5

l kg . l daN

Technical specifications

Natural frequency $\left\{ \begin{array}{l} . \ 25 \text{ Hertz depending on } \Delta \text{ Sh A} \\ \text{and loads} \end{array} \right.$

Amplification at resonance $\left\{ \begin{array}{l} \text{SILICONE} \ . \ 3 \\ \text{NEOPRENE} \ . \ 9 \end{array} \right.$
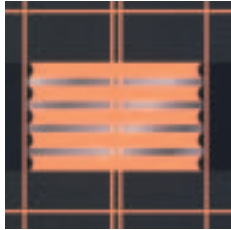
PAULSTRASIL®
SOUND AND THERMAL
INSULATION PANELS

DESCRIPTION

A cellular silicon elastomer specially developed for the aerospace, rail and high-tech industries for sound, heat and fire proofing over a large operating range.

SPECIAL FEATURES

- Meets the FO specifications for smoke toxicity.
- Meets NF P92 501 building specifications (M2 Class autoclave test).
- Meets Veritas grade 2 of the flame propagation capability.
- Meets FAR 25 853 (a) and (b) specifications.
- Meets ATS 1000.001 toxicity test.
- Very low smoke density and opacity.
- Very high resistance to natural ageing (U.V., ozone ...).
- Very high resistance to usual chemicals.
- Easy to use by bonding to all types of supports.
- A self-bonding version is available.

TECHNICAL DATA (as per A.S.T.M. test method)

Reference	Length x width mm	Thickness mm
820063		1.5
820065	1400 x 1000	3.2
820066		5.5
820067	1400 x 600	10

See current price list for availability of items.

PROPERTIES	VALUES
Density	0.18 to 0.35
Tensile strength	300 to 400 KPa
25% compression resistance, th. 3.2mm	0.5 Kg/m^2
Yield strength	>100%
Thermal conductivity	0.063 W/m°K
Ohmic resistance	2.9x10^{14} Ω cm
Flammability UI 94 th. 3.2 mm	V.O.

Colour: off-white (others on request)
Operating range: - 60 to + 200°C.

Under no circumstances must the data in the brochure be used for drawing up specifications, these are results obtained in good faith.
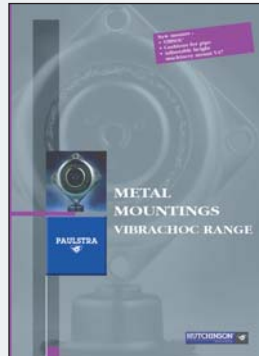

Test performed at 890°C

OTHER PAULSTRA DOCUMENTATION
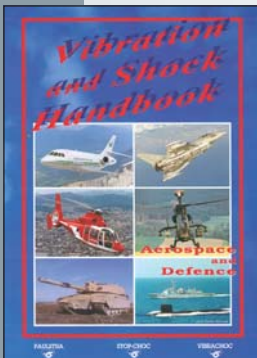
Available upon request
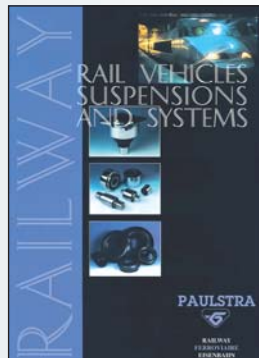
FLEXIBLE MOUNTINGS
CATALOG
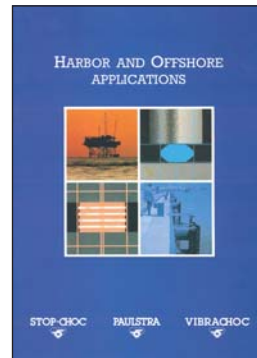
METAL MOUNTINGS
CATALOG
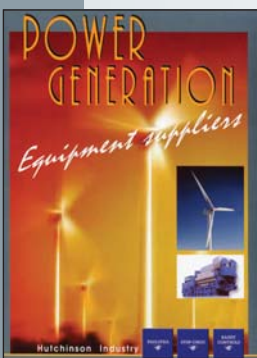
FLEXIBLE COUPLINGS
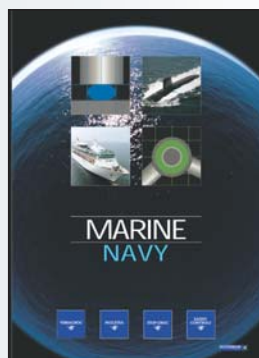CATALOG

AEROSPACE AND DEFENCE
CATALOG

RAILWAY
CATALOG

OFFSHORE
CATALOG

POWER GENERATION
CATALOG

MARINE / NAVY
CATALOG

INDUSTRIAL VEHICLES
CATALOG

PAULSTRA