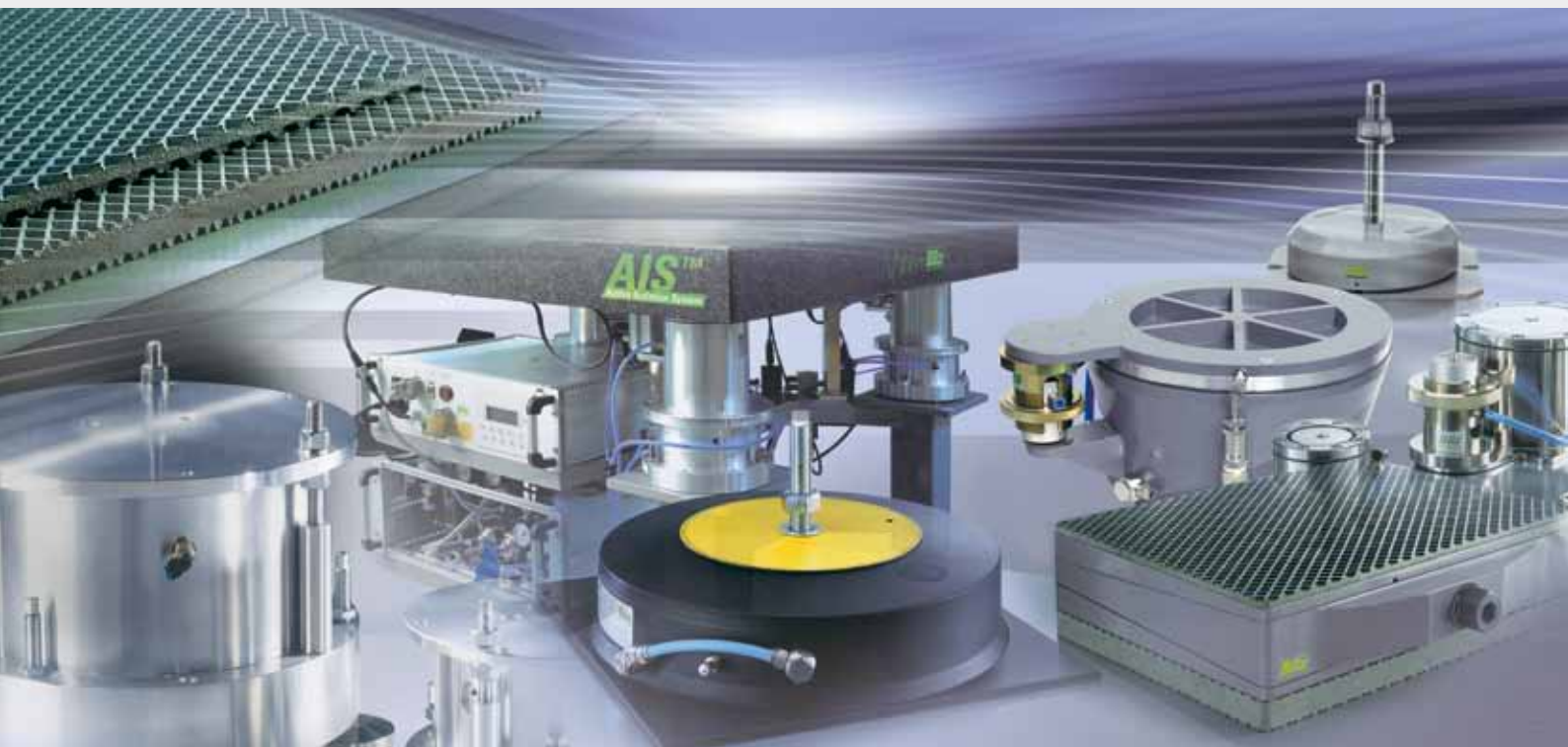


ANTI VIBRATION TECHNOLOGY

PRECISE MACHINE ADJUSTMENT



ENGLISH



BILZ Vibration Technology GmbH was founded in 1985, specialising in the field of anti-vibration and structure born noise isolation. BILZ is a market leader in the European Community in this field as a supplier to machine builders and the equipment manufacturing industry, as well as the automobile industry and their suppliers. Bilz was converted to a public limited company at the start of 2006.



Our product range covers a wide range of applications. From isolation of a forging hammer with isolating plate sets, to air spring systems that protect highly sensitive machines in the semiconductor industry, there is practically no vibration problem which cannot be solved today.

We have tried to arrange this brochure as clear and understandable as possible. If you have any questions, please ask.



○ Principles and Aims

Quality

In our opinion, quality stands for the most modern state-of-the-art products meeting your expectations and specifications. Only the best is good enough for your application.

Technical qualification

Our engineers and technical specialists are continually participating in training, and are being kept aware of current developments keeping them up-to-date with the latest technical standards.

Problem solvers

Our goal is always to be the best problem solvers in the area of vibration isolation.

Partnership

We value long-term cooperative relationships with customers and suppliers.

Service

A top priority of our service is providing our customers with training by one of our staff members.

Delivery

Most products listed in this catalogue are warehoused in our facility in Leonberg and can be shipped at short notice.

Pricing

Our prices are a fair reflection of our systems and components. We take care that this balance is not disturbed. If prices are too high, our customers must bear the burden, if they are too low, we lack the means to innovate and perform our services.



F o r e a c h p r o b l e m w e p r o v i d e t h e c o r r e c t s o l u t i o n !



BILZ Training- and Democenter



BILZ Democenter:
Active Isolation System AIS™
with six degrees of freedom



BILZ test bench
(1600 Newton X-Y-Z Shaker)

In 2005 BILZ Vibration Technology set up a new Training- and Democenter at the company headquarter. In the new showroom we can present and demonstrate the complete range of our products from BILZ-Insulating-Plates to the highly innovative Active Isolation System AIS™ with six degrees of freedom. On a regular basis we arrange courses and training for our staff members and our world wide representatives.

To provide our customers with the required service we offer demonstration installations concerning functionality, layout and advantages of all the different Bilz-Isolations-Systems. With the new test bench we have extended our technical equipment and improved the competence concerning development, quality improvement as well as customised design and layout.

A 1600 Newton X-Y-Z Shaker for system oscillation is integrated in the test bench. The working range concerning frequency spectrum is 0,5 to 300 Hz.

The test bench including measuring equipment provides all needed system characteristics in the complete frequency range including resonance frequencies of the isolation systems as well as building and construction characteristics. In combination with 3D-simulation and calculation BILZ Vibration Technology can analyse the requirements and guarantee a customized solution to meet your expectations.

BILZ-Technology and Know-How for maximum quality

- Vibration and structure-borne noise insulation through the most modern materials.
- Cost reduction due to flexible machinery.
- Quality improvement through vibration suppression.
- Preservation of machinery and buildings.
- Prolonged tool and machinery life.
- Protection of health through vibration and structureborne noise insulation (environment protection).
- Certification according to DIN ISO 9001 – 2008.



100Hz

16

PEAK

208/16

3352 rpm



General Information on Vibration Technology

Today the reduction of vibration emission and vibration immission play an important part in the operation of plant and machinery, etc. The constant improvement in machine performance over recent years has generally been accompanied by increased speeds and cutting rates, as well as an increase in impact power in the field of forming. This means an increase in the vibrations transmitted to the surroundings, which must be efficiently controlled.

Matching up the important factors

Insulation of sinusoidal vibrations

The efficiency of vibration insulation depends to a large extent on the relationship between the machine speed/stroke rate and the natural vibration frequency of the insulator (matching ratio). In general, it can be said that the lower the natural vibration frequency of the insulator, i.e. the greater the ratio between forcing frequency and natural frequency, the greater the efficiency of the insulator. The diagram below shows that vibration insulation does not take effect until the matching ratio (η) is greater than $\sqrt{2}$.

It follows that: Efficiency of vibration insulation
 f_o = natural frequency of insulator
 f_m = forcing frequency of the machine
 $J_s = \frac{\left(\frac{f_m}{f_o}\right)^2 - 2}{\left(\frac{f_m}{f_o}\right)^2 - 1} \cdot 100 \%$

Transmissibility by taken dampening factor D into consideration is:

$$v_p = \sqrt{\frac{1 + 4 D^2 \eta^2}{(1 - \eta^2)^2 + 4 D^2 \eta^2}} ; \quad \eta = \frac{\text{forcing frequency}}{\text{natural frequency of isolates}}$$

Impact insulation

The physical properties of impacts are their duration, direction and magnitude. The object of impact insulation is to change the forcing frequency consisting of a high kick into an impulse of longer duration accompanied by small residual forces. Different from periodically excited vibrations, the system provided with springs vibrates in the

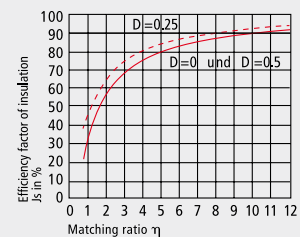
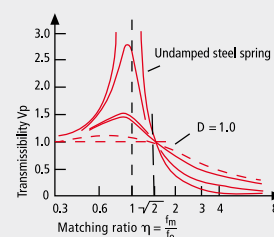
The basic principle of vibration isolation

The objective of using insulating devices for machine mounting is the reduction of pulsating (repetitive), or sinusoidal vibrations. The task is to keep the motion (amplitude) of the flexibly mounted machine within permissible limits for operation. The vibration insulators selected must have sufficient dampening capacity!

No insulating effect can be expected at frequency ratios of less than $\sqrt{2}$. Quite the opposite: an increase in (excessive) vibration must be anticipated.

As a rule a matching ratio (η) between 3 ... 4 is attempted, with 3 being taken as the technical minimum and 4 the economic maximum.

A bigger matching ratio (η) than 4 cannot be justified for economic reasons, as the material expense would increase out of proportion to the insulating effect.



excited natural frequency of the insulated system, not according to its number of strokes. The residual forces transferred via the insulators become increasingly smaller, the longer the natural vibration period lasts and therefore the smaller the natural frequency of the system sitting on a foundation equipped with springs.

So, the efficiency factor of an impact insulation is:

$$J_s = 100 \times \left(1 - \frac{1}{\eta_s^2}\right) \% ; \quad \eta_s = \frac{\eta_b}{\eta_e}$$

η_b = natural frequency of the system rigidly secured to the ground

η_e = natural frequency of the system when placed on insulators containing springs

Types of Vibration Insulation

We differentiate between active and passive insulation. If the objective is to prevent spreading of the vibrations caused by a machine (vibration emission), we talk of active insulation. If, on the other

hand, precision machining equipment which is extremely sensitive to vibrations is to be protected from vibration immission, this is described as passive insulation.

Important Definitions

Damping = the physical property of an insulator to limit resonance vibration to the permissible level. During this process, mechanical energy is converted into heat.

Isolation = insulating of an actuating force.

Vibration emission = vibration created by the machinery that is propagated to the surroundings.

Vibration immission = vibration present in the surroundings that is propagated to the machinery.

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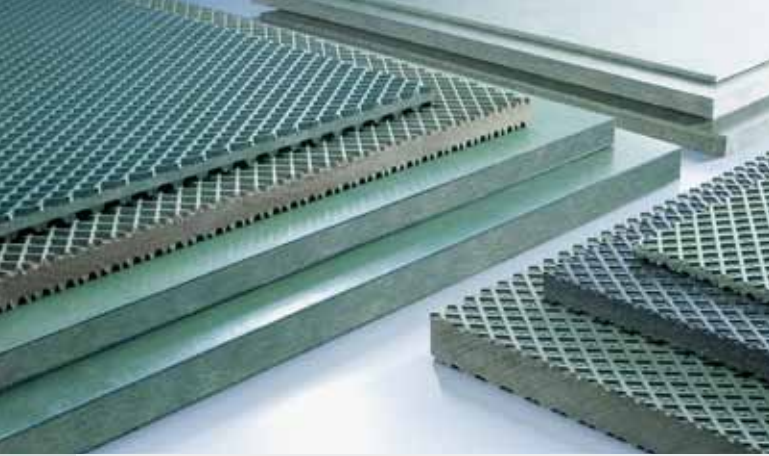
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Item Insulating Plates

for vibration and structure-borne noise isolation

Product Description

BILZ insulating plates are highly developed materials designed to solve problems caused in many industrial sectors by vibrations and structure-borne noise. Made from a precise combination of nitrile rubber, cork particles and cross-linked polyester-fibre, this high-grade compound material possesses excellent physical and mechanical properties. One major advantage of this new compound material is its resistance to modern cooling lubricants; the mountings can thus also be used in oil sumps without any loss of physical properties. Particularly worth mentioning are the superb "compression set" values. These are extremely important, for example, if modern machine tools are to be insulation-mounted while ensuring long-term geometric position. 8 different types of plates provide the technically optimal solution to almost any vibration problem. The primary aim in the development of these was to provide specific solution for a wide range of machinery for e.g. lathes, milling machines and grinding machines, as well as presses and feed presses!

Lubricants

Roller and friction bearing greases, gear lubricant grease

Synthetic lubricants

Polyalkylenglycols, ester of a carbonic acid, radiator antifreeze

Fuels and motor fuels

Petrol (gasoline), diesel, heating fuel, aviation gasoline, special motor fuels

Fire resistant pressure liquids

Oil in water emulsions, water in oil emulsions, water polymeric solutions

Resistance to Aging

The service life of these mounting plates is nearly unlimited if the load values are observed. No permanent deformation.

Resistance to Chemicals

Extremely high degree of resistance to conventional oils, grease, acids, etc.

Completely resistant to cooling emulsions, thus allowing machine mounting in oil sumps.

Resistance to Temperature

+ 120° to - 20° Celsius

Mineral Oils

Cooling lubricants mixable with water, ATF (Automatic Transmission Fluid), cooling lubricants, water mixable anticorrosive oils, sliding belt oils, compressed air oils, lubricants, thermal oils, filter oils, rolling oils, gear lubricant oils for cars, brake fluids and mineral oil basis

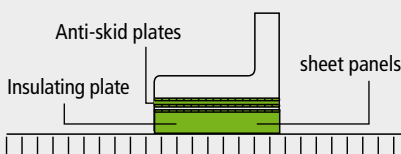
Purifiers

Chlorinated hydrocarbons, petroleum ether/benzene, cold purifiers

Purifiers (watery solutions)

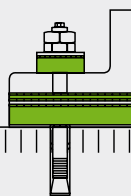
Washing and Rinsing agents, wetting agents, dilute acids, dilute alkaline solutions, salt solutions

Application Technology 1



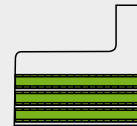
Machine mounting on BILZ insulating plates for machines that don't require a high degree of mounting precision. Floor unevenness can be compensated for by using shim plates, etc. The plates are normally geometrically positioned. Size is determined on the basis of machine weight and available contact area.

Application Technology 2

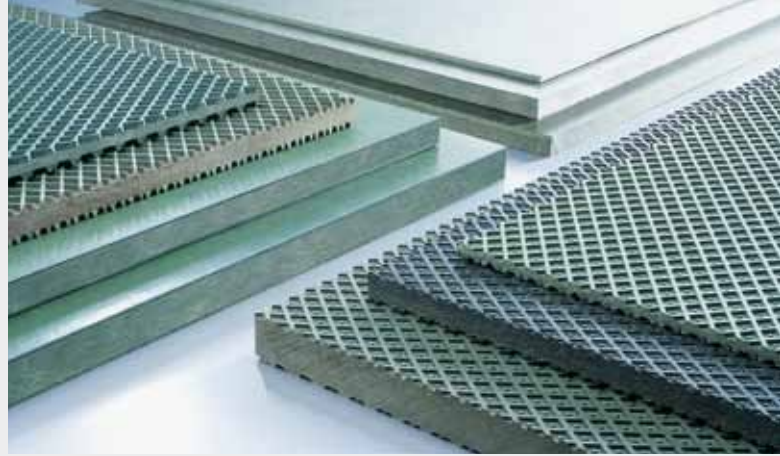


Schematic illustration of floor anchorage using insulator plate and washer. In some cases, it is necessary to anchor the object to be insulated to the floor. The use of insulator washers prevents vibrations being transmitted via the screw connection. In particularly difficult cases, it is advisable to use adjusted disc springs. Size, etc. is determined by BILZ.

Application Technology 3



Highly effective impact and vibration insulation using BILZ insulator plate sets. When insulating pulsating forces (presses, hammers, feed presses), BILZ plates are in this case combined to form sets. This helps to achieve extremely low natural vibration frequencies. Their great advantage over steel springs in the very high attenuation capacity.



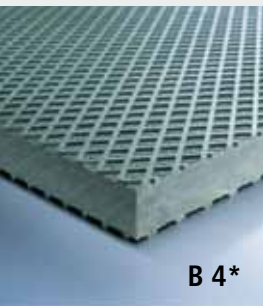
square

size of plates mm	surface area cm ²	size of plates mm	surface area cm ²
1000 x 500	5000	150 x 100	150
500 x 500	2500	150 x 75	112
500 x 250	1250	100 x 100	100
250 x 250	625	100 x 50	50
200 x 200	400	75 x 75	56
200 x 100	200	50 x 50	25
150 x 150	225		

round

size of plates mm	surface area cm ²
50 Ø	20
75 Ø	44
110 Ø	95
130 Ø	133
150 Ø	176
200 Ø	314
238 Ø	450
300 Ø	710

Important Notice: BILZ Plates can be cut with any circular or band-saw.
If requested we shall be pleased to supply you with special dimensions.

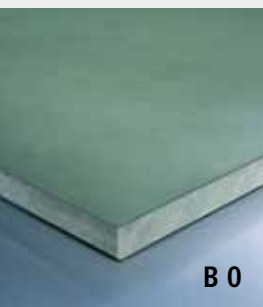
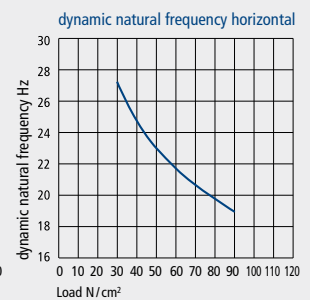
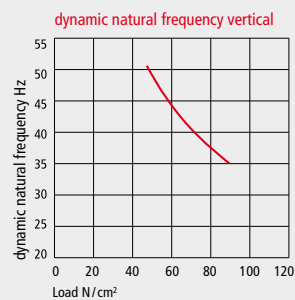


B 4*

Range of application:

Very universal. Can be used for machine tools, plastic and printing machines. Extremely well suited to machines with a tendency to "migrate".

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 4*	30–100	15	0,8

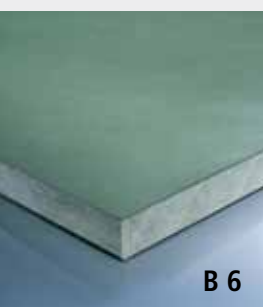
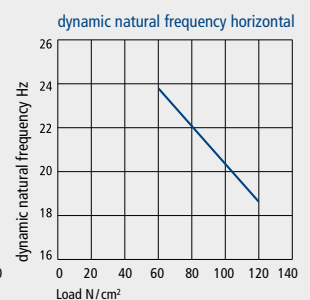
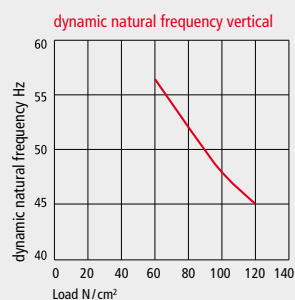


B 0

Range of application:

Without profile. Very high level consistency. Particularly for machines with little rigidity such as: lathes, machining centers, transfer lines etc.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 0	50–120	15	0,6

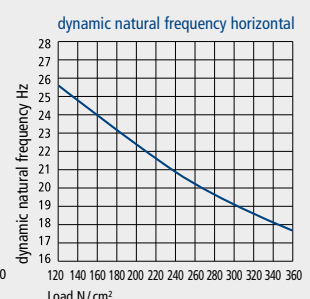
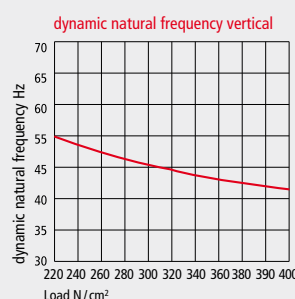


B 6

Range of application:

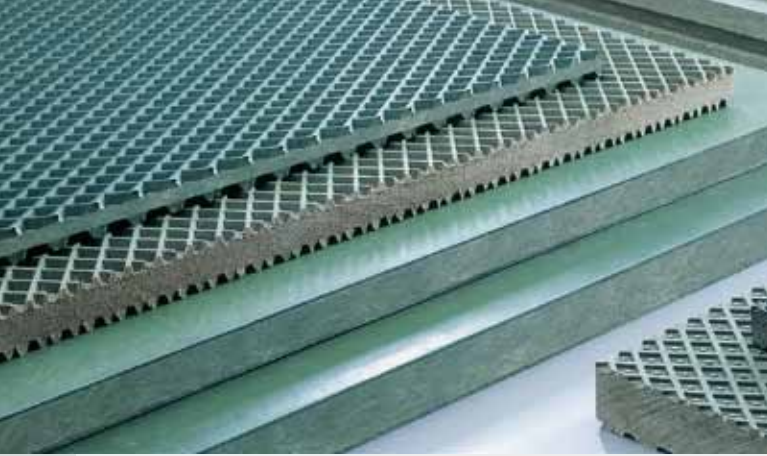
Insulating plate with extremely high loadability coupled with maximum level consistency. E.g. for very heavy and long bedded machining centers, transfer lines etc.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 6	100–400	15	0,6



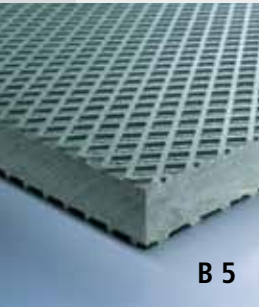
* Can be supplied also with profile on one side only! Designation e.g. B4 - 1.

** Coefficient of friction compared to industrial floor pavement.



Item Insulating Plates

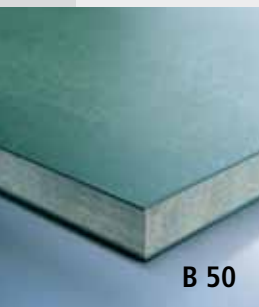
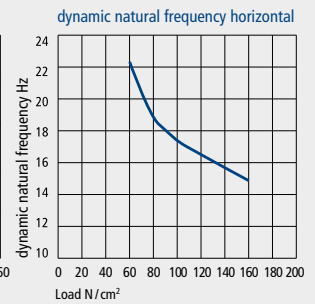
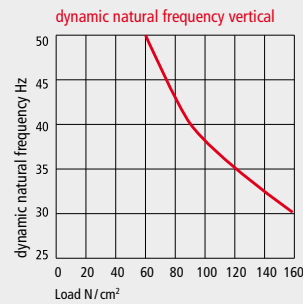
for vibration and structure-borne noise isolation



Range of application:

For machines with high dynamic disturbance properties and only a small support plate, e.g. presses, stamping presses, shears etc.

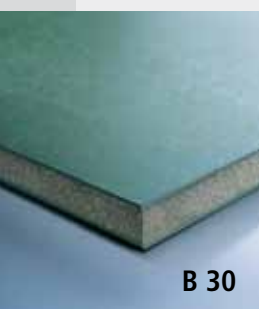
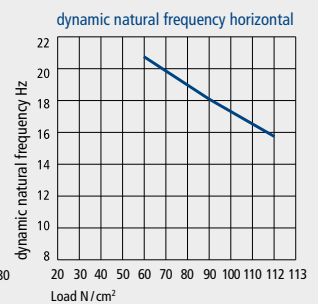
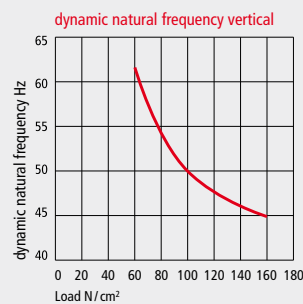
Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 5	50–160	25	0,8



Range of application:

For machines with high dynamic disturbance properties and only a small support plate, e.g. presses, stamping presses, shears etc.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 50	50–200	25	0,8

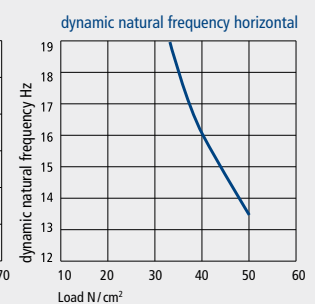
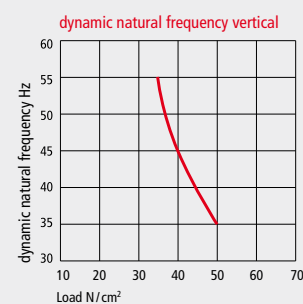


Range of application:

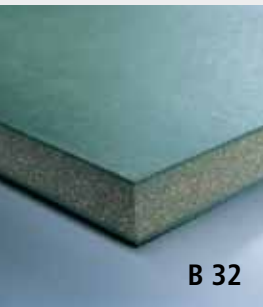
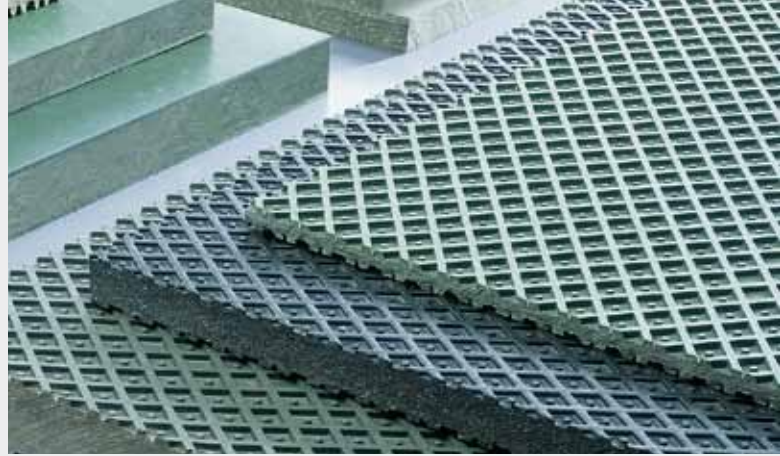
Soft kind without any profile.

Specially suited for effective insulation of lighter presses, punching machines etc. on upper floors.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 30	20–50	18	0,8



****** Coefficient of friction compared to industrial floor pavement.

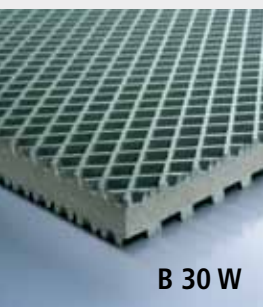
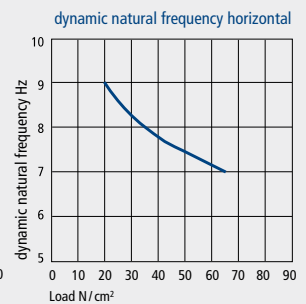
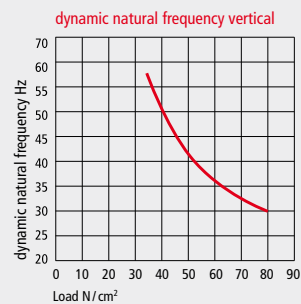


B 32

Range of application:

Soft kind similar to B 30, but with higher load capability.
For medium to big presses, punching presses etc.
Very high insulation!

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 32	20–80	25	0,8

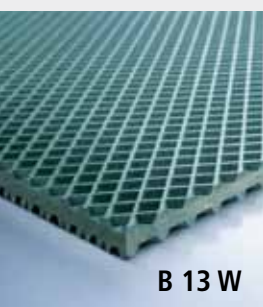
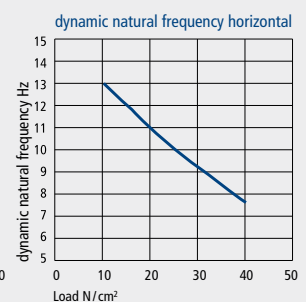
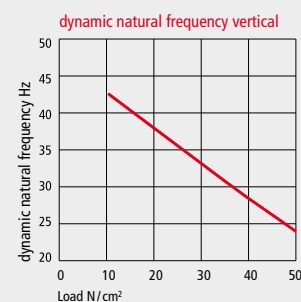


B 30 W

Range of application:

Very soft kind for mainly passive insulation.
High insulation effect due to low frequency tuning.
E.g. for measuring and testing machines, scales, microscopes and grinders.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 30 W*	5–40	18	0,8

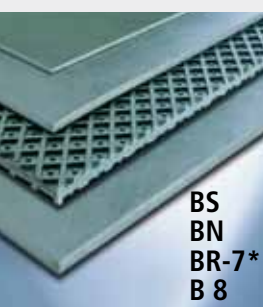
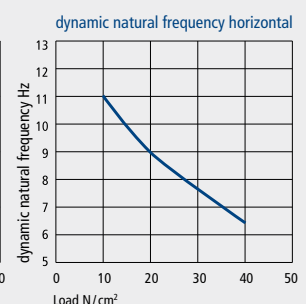
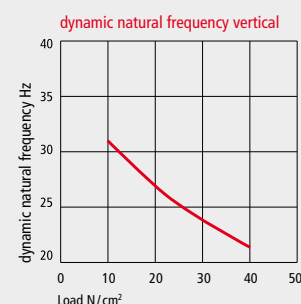


B 13 W

Range of application:

Special kind for highest insulation values, can be stacked up to 5 times. Tuning up to approx. 8 Hz.
Recommended as so-called plate-set for foundation insulations.

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
B 13 W	5–35	13	0,8



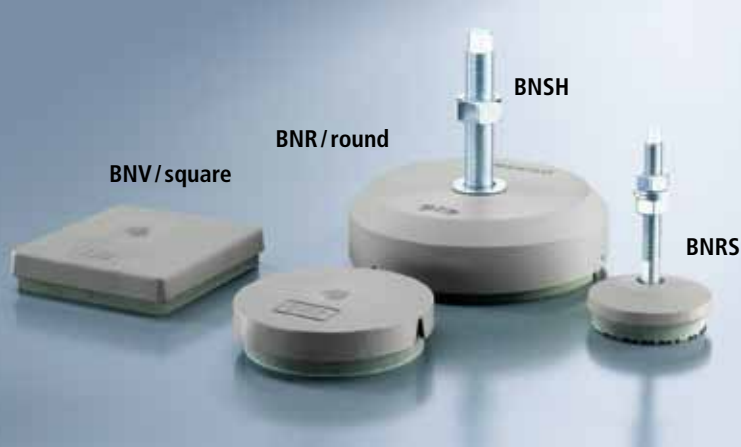
**BS
BN
BR-7*
B 8**

Range of application:

BILZ anti-skid and spacer plates.
No vibration insulation!

Type	Load N/cm ²	Thickness mm	Coefficient of friction η^{**}
BS	10–400	2	0,9
BN	10–300	5	0,6
BR-7*	10–100	7	0,8
B 8	5–35	8	0,8

- * Can be supplied also with profile on one side only! Designation e.g. B4 - 1
- ** Coefficient of friction compared to industrial floor pavement.



Drill press on leveling elements

Leveling elements series, type BNSH

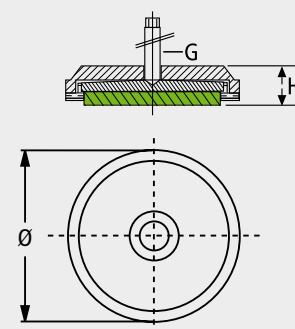
Range of application: BILZ leveling elements BNS are specially suited for the positioning of presses, automatic stamping machines automatic die-casting machines etc.

Examples: BNSH 120 / 50 means: equipped with type 50.

Application: Medium efficiency of isolation.

BNSH 120 / 32 means: equipped with type B32.

Application: For highly effective insulations. In particular used on upper floors.



Type	max. load N/pc.	Type	max. load N/pc.	H = height mm	Ø = mm	range of adjust- ment mm	G
BNSH 70 / 50	4500	BNSH 70 / 32	2500	42	80	6	M 10 x 1,25 x 100/125
BNSH 80 / 50	8000	BNSH 80 / 32	5000	45	96	18	M 12 x 1,5 x 80/125/150
BNSH 120 / 50	16.000	BNSH 120 / 32	10.000	51	133	18	M 16 x 1,5 x 100/150/200
BNSH 160 / 50	35.000	BNSH 160 / 32	22.000	54	175	18	M 20 x 1,5 x 100/125/150/200
BNSH 175 / 50	43.000	BNSH 175 / 32	27.000	57	200	18	M 20 x 1,5 x 100/125/150/200
BNSH 200 / 50	65.000	BNSH 200 / 32	36.000	64	227	18	M 24 x 2,0 x 150/200
BNSH 250 / 50	90.000	BNSH 250 / 32	48.000	66	270	15	M 30 x 2,0 x 150/200

Leveling Elements, Type Serie BNSHA

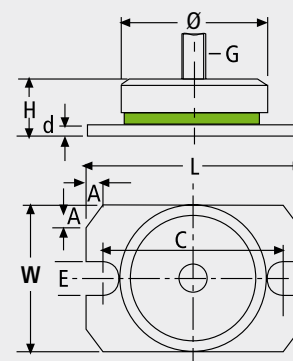
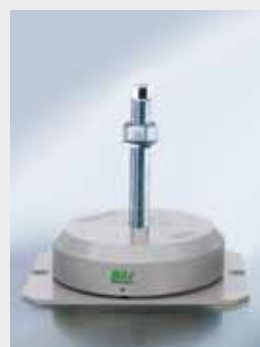
Range of application: BILZ leveling elements BNS are specially suited for the positioning of presses, automatic stamping machines automatic die-casting machines and for all machines which have to be mounted to the floor.

Examples: BNSHA 120 / 50 means: equipped with type B50.

Application: Medium efficiency of isolation.

BNSHA 120 / 32 means: equipped with type B32.

Application: For highly effective insulations. In particular used on upper floors.



Type	L	W	Ø	C	d	E	A	H	G
BNSHA 80	140	90	96	120	5	8	15	50	M 12 x 1,5 x 80/125/150
BNSHA 120	180	125	133	160	5	13	15	59	M 16 x 1,5 x 100/150/200
BNSHA 160	220	170	175	200	5	16	15	65	M 20 x 1,5 x 100/125/150/200
BNSHA 175	260	185	200	230	8	20	20	73	M 20 x 1,5 x 100/125/150/200
BNSHA 200	300	225	227	270	8	20	20	77	M 24 x 2,0 x 150/200
BNSHA 250	330	265	270	300	8	20	20	77	M 30 x 2,0 x 150/200

Range of adjustment and load capacity same as BNSH.

Leveling elements series of types BNV and BNR

BNV (square)

Range of application: BILZ leveling elements BNV + BNR are reliable and economic elements preferably used for light to medium weight machines with respective mounting holes in the machine base.

Examples: BNV 110/4 = 4 means: equipped with type B 4!

Application: milling machines, drilling machines, general use!

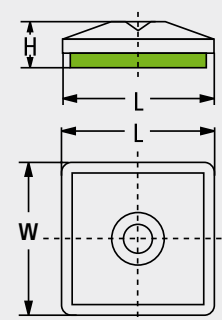
BNV 110/0 = 0 means: equipped with type B 0!

Application: lathes, machining centers etc.!

BNV 110/30-W = 30 W means: equipped with type B 30 W!

Application: soft material for passive isolation – grinders, testing equipment, measuring machines etc.!

Screws and nuts can be supplied upon request (page 15).



Leveling Elements

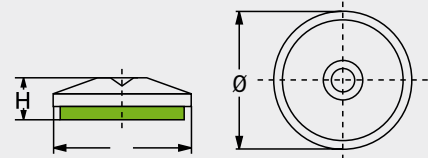
for vibration and structure-borne noise isolation

BNV (square)

Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	L mm	W mm	H type 4 mm	H type 0 mm	H type 30 W
BNV 50/4	1500	BNV 50/0	2000	BNV 50/30 W	650	60	60	22	22	25
BNV 80/4	4500	BNV 80/0	5500	BNV 80/30 W	1600	85	85	24	24	27
BNV 110/4	10000	BNV 110/0	12000	BNV 110/30 W	4000	123	123	27	27	30
BNV 115/4	10000	BNV 115/0	12000	BNV 115/30 W	4000	163	88	29	29	32
BNV 150/4	18000	BNV 150/0	22500	BNV 150/30 W	7000	147	147	32	32	35
BNV 200/4	30000	BNV 200/0	40000	BNV 200/30 W	14000	260	165	35	35	38

BNR (round)

Screws and nuts can be supplied upon request (page 15).



Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	Ø mm	H type 4 mm	H type 0 mm	H type 30 W
BNR 50/4	1500	BNR 50/0	1500	BNR 50/30 W	550	60	21	21	24
BNR 80/4	4000	BNR 80/0	5000	BNR 80/30 W	1400	85	21	21	24
BNR 110/4	8000	BNR 110/0	10000	BNR 110/30 W	3000	121	26	26	29
BNR 150/4	15000	BNR 150/0	18000	BNR 150/30 W	4500	162	30	30	33
BNR 200/4	25000	BNR 200/0	35000	BNR 200/30 W	10000	213	30	30	33

Leveling elements series, types BNVS / BNRS with leveling screws (flexibly connected)

Range of application:

Types **BNVS** + **BNRS** are used in cases where a firm connection of the element to the machine is desirable! Angle differences are equalized by means of the movable leveling screw.

Examples:

BNVS 110/4 = 4 means: equipped with type **B 4**!

Application: milling machines, drilling machines!

BNVS 110/0 = 0 means: equipped with type **B 0**!

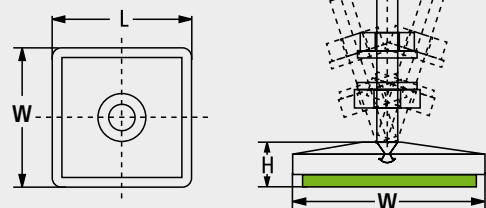
Application: lathes, machining centers etc.!

BNVS 110/30-W = 30 W means: equipped with type **B 30 W**!

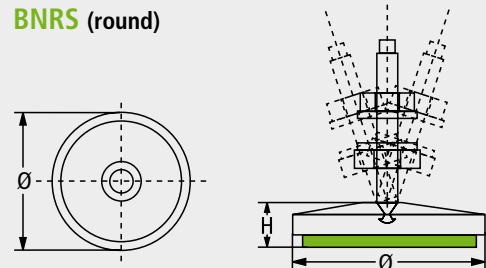
Application: suited for all machines requiring no vibration insulation, anti-slip only.

Important: When ordering please specify the desired size of leveling screw. We stock sizes from M 10 to M 24, in lengths from 70 to 300 mm (page 15).

BNVS (square)



BNRS (round)



Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	W mm	H type 4 mm	H type 0 mm	H type 30 W
BNVS 50/4	1500	BNVS 50/0	2000	BNVS 50/30 W	650	60	22	22	25
BNVS 80/4	4500	BNVS 80/0	5500	BNVS 80/30 W	1600	85	24	24	27
BNVS 110/4	10000	BNVS 110/0	12000	BNVS 110/30 W	4000	123	27	27	30
BNVS 150/4	18000	BNVS 150/0	22500	BNVS 150/30 W	7000	147	32	32	35
BNVS 200/4	30000	BNVS 200/0	40000	BNVS 200/30 W	14000	260	35	35	38

Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	Ø mm	H type 4 mm	H type 0 mm	H type 30 W
BNRS 50/4	1000	BNRS 50/0	1500	BNRS 50/30 W	550	60	21	21	24
BNRS 70/4	4000	BNRS 70/0	4500	BNRS 70/30 W	1400	78	28	28	31
BNRS 110/4	8000	BNRS 110/0	10000	BNRS 110/30 W	3000	121	28	28	31
BNRS 150/4	15000	BNRS 150/0	18000	BNRS 150/30 W	4500	162	30	30	33
BNRS 200/4	25000	BNRS 200/0	35000	BNRS 200/30 W	10000	213	30	30	33



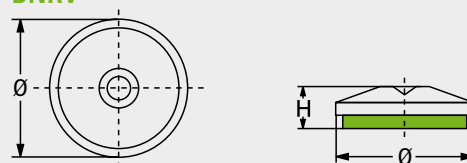
Leveling Elements, Type Series **BNRV** and **BNRSV** in stainless steel

Field of application:

For machines of the food, beverages and tobacco industries.
For machines of the packaging, chemistry and pharmaceutical industries.

Screws and nuts can be supplied on request.

BNRV



Type series **BNRV** without leveling screw

Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	Ø mm	H = type 4 mm	H = type 30-W mm	H = type BR 7 mm
BNRV 50/4	1500	BNRV 50/30-W	500	BNRV 50/BR 7	2000	54	23	26	15
BNRV 70/4	4000	BNRV 70/30-W	1500	BNRV 70/BR 7	6000	76	25	28	17
BNRV 110/4	8000	BNRV 110/30-W	4000	BNRV 110/BR 7	12000	116	27,5	30,5	19,5
BNRV 150/4	15000	BNRV 150/30-W	8000	BNRV 150/BR 7	25000	156	29,5	32,5	21,5

Type **BNRSV** with leveling screw

(flexibly connected)

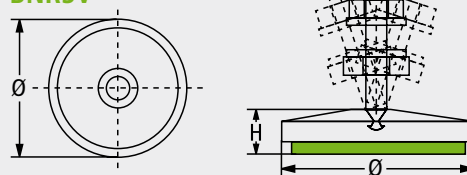
in stainless steel

Examples:

BNRV 110/4 e.g. BNRSV 110/4 = 4 meaning: equipped with medium hard insulating panel. Provides good vibration and structure-borne noise insulation.

BNRV 110/30-W e.g. BNRSV 110/30-W = 30-W meaning: equipped with soft insulating panel. Provides high-quality vibration and structure-borne noise insulation.

BNRSV



BNRV 110/BR 7 e.g. BNRSV 110/BR 7 = BR 7 stands for: equipped with anti-slip panel. No vibration insulation!

Type	load N/pc.	Type	load N/pc.	Type	load N/pc.	leveling screw incl. 2 nuts + 2 washers (VA) mm
BNRSV 50/4	1500	BNRSV 50/30-W	500	BNRSV 50/BR 7	2000	M 10 x 70 / 100 / 200
BNRSV 70/4	4000	BNRSV 70/30-W	1500	BNRSV 70/BR 7	6000	M 12 x 100 / 150 / 200
BNRSV 110/4	8000	BNRSV 110/30-W	4000	BNRSV 110/BR 7	12000	M 16 x 100 / 150 / 200
BNRSV 150/4	15000	BNRSV 150/30-W	8000	BNRSV 150/BR 7	25000	M 20 x 100 / 150 / 200

(All screws are suitable for all element sizes)

Type **BFE** with leveling screw

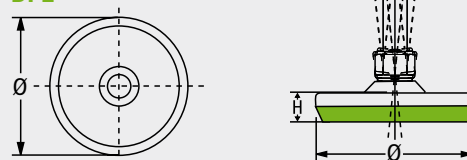
(flexibly connected)

in stainless steel

Field of application:

Low cost stainless steel elements for the food, pharmaceutical, the packing and the chemistry industry.

BFE



Type	Ø mm	H mm	load N/pc.	leveling screw incl. 2 nuts + 2 washers (VA) mm
BFE 50	50	14	3000	M 8 / 10 x 50 / 80 / 100 / 120 / 150 / 180 / 200
BFE 80	80	17	8500	M 12 x 50 / 80 / 100 / 120 / 150 / 180 / 200
BFE 100	100	19	20000	M 16 x 50 / 80 / 100 / 120 / 150 / 180 / 200 / 250 / 300
BFE 125	125	19	30000	M 20 x 50 / 80 / 100 / 120 / 150 / 180 / 200 / 250 / 300
				M 24 x 50 / 80 / 100 / 120 / 150 / 180 / 200 / 250 / 300
				M 30 x 50 / 80 / 100 / 120 / 150 / 180 / 200 / 250 / 300

(All screws are suitable for all element sizes)

Accessories



Leveling screws (galvanized)

incl. 2 nuts + 2 washers (VA)



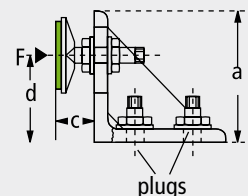
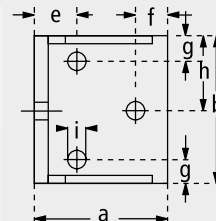
The size of the screws depends upon the dynamic and static load and the size of the hole in the machine foot!

Ø Length in mm	M10	M12	M16	M18	M20	M24
70		70				
100		100	100	100	100	
		125	125	125	125	
		150	150	150	150	150
			200	200	200	200
			250	250	250	250
				300	300	300
						350

Horizontal elements

Size 1, consisting of:
steel angle, leveling element type BNV 115/5,
3 screws M 16x150, 2 patented plugs M 16

Size 2, consisting of:
steel angle, leveling element type BNV 115/5,
3 screws M 20x150, 3 patented plugs M 20



Dimensions mm	a	b	c	d min	d max.	e	f	g	h	i	F in N
Size 1	140	125	45	60	115	50	25	35	90	17,5	15000
Size 2	160	180	55	60	140	50	40	35	90	22	25000

Insulating disks for screws head insulation



Isolation of structure-borne noise for deep-seated machines and pipe suspensions.

for screws Ø	outside Ø mm	hole Ø mm	mounting height mm	max. restress force N
bis M 12	35	13	20	2000
bis M 20	50	21	21	3000
bis M 30	70	31	25	4500

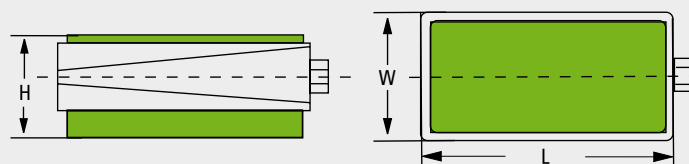
Anchor

Heavy duty anchor SL
Fischer anchor R + threaded rod RG
Fischer anchor bolt FAZ





Krauss Maffei injection molding machine on precision wedge mounts



A

range of application
Component Set A

Top:
anti skid plate BR 7-1
Bottom:
Insulating plate B 4-1

General tool and graphic machines, in particular machines with horizontal components.
High anti-slip protection!

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-A	5400	105	55	59	+4 / -5
PK 2-A	10000	150	75	63	+5 / -6
PK 3-A	18000	200	95	67	+6 / -5
PK 3/72-A	18000	200	95	94	+5 / -4
PK 4-A	38000	200	200	70	+5 / -8
PK 4/72-A	38000	200	200	94	+6 / -12
PK 5-A	48000	200	250	94	+10 / -7
PK 6-A	81000	250	330	94	+8 / -10
PK 7-A	118000	300	400	94	+8 / -11
PK 8-A	197000	400	500	97	+9 / -13
PK 9-A	296000	500	600	127	+13 / -15



B

range of application
Component Set B

Top:
anti skid plate BS
Bottom:
Insulating plate BO

Special design for CNC lathes, surfaces and cylindrical grinders, drilling and milling machines, machining centers, transfer lines.

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-B	6500	105	55	54	+4 / -5
PK 2-B	13000	150	75	58	+5 / -6
PK 3-B	22000	200	95	63	+6 / -5
PK 3/72-B	22000	200	95	89	+5 / -4
PK 4-B	47000	200	200	66	+5 / -8
PK 4/72-B	47000	200	200	89	+6 / -12
PK 5-B	58000	200	250	89	+10 / -7
PK 6-B	97000	250	330	89	+8 / -10
PK 7-B	142000	300	400	89	+8 / -11
PK 8-B	236000	400	500	92	+9 / -13
PK 9-B	355000	500	600	122	+13 / -15



C

range of application
Component Set C

Top:
anti skid plate BS
Bottom:
Insulating plate B 32

For highly effective insulations in the active and passive range. In particular when used on upper floors. Please ask for our advice, without obligation, regarding any critical situation.

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-C	4500	105	55	64	+4 / -5
PK 2-C	8700	150	75	68	+5 / -6
PK 3-C	15000	200	95	73	+6 / -5
PK 3/72-C	15000	200	95	99	+5 / -4
PK 4-C	31000	200	200	76	+5 / -8
PK 4/72-C	31000	200	200	99	+6 / -12
PK 5-C	39000	200	250	99	+10 / -7
PK 6-C	65000	250	330	99	+8 / -10
PK 7-C	95000	300	400	99	+8 / -11
PK 8-C	157000	400	500	102	+9 / -13
PK 9-C	237000	500	600	132	+13 / -15

Precision Wedge Mounts

for vibration and structure-borne noise isolation

○ Precision Leveling Wedge

BILZ Precision Leveling Wedge PK are manufactured in three different types; free standing (PK Series), bolt-on to the machine (PKA Series), bolt-through to the foundation (PKD Series). The design permits the highest precision leveling range of 1/100 mm. Creep from their preset position is prevented by the self-locking design. Large support surfaces provide optimum foundation support and rigidity. Any of the BILZ Isolation materials can be bonded to the leveling wedge to provide the required isolation.

Notice: We are always pleased to fulfill special requests!

Wrench sizes A / F for BILZ PKs

Type	inside	outside	Type	inside	outside
PK 1	SW 6	SW 13	PKA / PKD 1	SW 10	SW 19
PK 2	SW 10	SW 19	PKA / PKD 2	SW 12	SW 22
PK 3	SW 12	SW 22	PKA / PKD 3	SW 12	SW 22
PK 4	SW 12	SW 22	PKA / PKD 4	SW 14	SW 27
PK 5	SW 14	SW 27	PKA / PKD 5	SW 14	SW 27
PK 6	SW 14	SW 27	PKA / PKD 6	SW 17	SW 32
PK 7	SW 17	SW 32	PKA / PKD 7	SW 19	SW 41
PK 8	SW 19	SW 41	PKA / PKD 8	SW 22	SW 50
PK 9	SW 22	SW 50			



D

range of application Component Set D

Top:
anti skid plate BR 7-1
Bottom:
Insulating plate B 5

For machines with extremely high dynamic forces such as presses, stamping machines, shears etc.

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-D	8700	105	55	67	+4 / -5
PK 2-D	17000	150	75	71	+5 / -6
PK 3-D	29000	200	95	76	+6 / -5
PK 3/72-D	29000	200	95	104	+5 / -4
PK 4-D	62000	200	200	79	+5 / -8
PK 4/72-D	62000	200	200	104	+6 / -12
PK 5-D	75000	200	250	104	+10 / -7
PK 6-D	129000	250	330	104	+8 / -10
PK 7-D	189000	300	400	104	+8 / -11
PK 8-D	315000	400	500	107	+9 / -13
PK 9-D	470000	500	600	137	+13 / -15



E

range of application Component Set E

Top:
anti skid plate BS
Bottom:
Insulating plate BS

For all machines and systems requiring no vibration insulation. Ideally suited for assembly. Good stability due to non-slip character of plates extremely low construction!

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-E	16000	105	55	41	+4 / -5
PK 2-E	33000	150	75	45	+5 / -6
PK 3-E	55000	200	95	49	+6 / -5
PK 3/72-E	55000	200	95	76	+5 / -4
PK 4-E	117000	200	200	52	+5 / -8
PK 4/72-E	117000	200	200	76	+6 / -12
PK 5-E	145000	200	250	76	+10 / -7
PK 6-E	240000	250	330	76	+8 / -10
PK 7-E	355000	300	400	76	+8 / -11
PK 8-E	590000	400	500	79	+9 / -13
PK 9-E	885000	500	600	109	+13 / -15



F

range of application Component Set F

Top:
anti skid plate BS
Bottom:
Insulating plate B 6

For extremely high loadability.
Very high level constancy.

Type	load N/pc.	L mm	W mm	H in intermediate pos. mm	range of adjustment mm
PK 1-F	21000	105	55	54	+4 / -5
PK 2-F	43000	150	75	58	+5 / -6
PK 3-F	70000	200	95	63	+6 / -5
PK 3/72-F	70000	200	95	89	+5 / -4
PK 4-F	150000	200	200	66	+5 / -8
PK 4/72-F	150000	200	200	89	+6 / -12
PK 5-F	190000	200	250	89	+10 / -7
PK 6-F	310000	250	330	89	+8 / -10
PK 7-F	450000	300	400	89	+8 / -11
PK 8-F	750000	400	500	92	+9 / -13
PK 9-F	1150000	500	600	122	+13 / -15



Gildemeister NEF 330
on precision leveling wedge mounts

○ Precision Leveling Wedge Mounts, Series PKA (bolt-on)

BILZ precision leveling wedge PKA are used where a firm mounting with the machine is required. Preferably on machines with a high axial thrust such as die-casting machines, injection machines, shock testing machines, and cold extrusion presses etc.

Notice: We are always pleased to fulfill special requests!

PKA 1-0 up to PKA 8-0

Range of application:

lathes, horizontal drilling machines, surface and cylindrical grinders, machining centers

Equipment:

Bottom: **insulating plate BO**

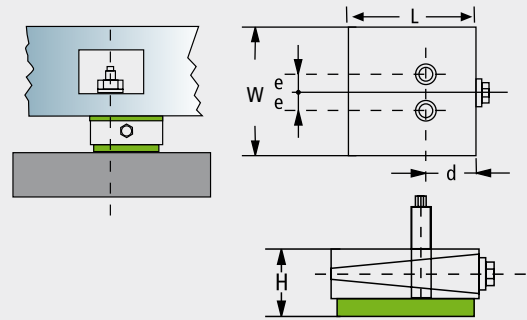
PPKA 1-4 up to PKA 8-4

Range of application: Plastic extrusion machines, pressure diecasting machines, planers, shock testing machines, cold extrusion presses etc.

Equipment: Bottom: **insulating plate B 4-1**

Very good anti-slip properties.

Screws can be supplied upon request (page 15).



type	load N/pc.	L mm	W mm	H in intermediate pos. mm	d mm	e mm	inside thread	range of adjustment mm
PKA 1-0	15000	115	115	60	50	24	M 16	+3 / -4
PKA 2-0	25000	150	150	63	60	23	M 18	+4 / -4
PKA 3-0	47000	200	200	63	75	27	M 20	+5 / -5
PKA 3/72-0	47000	200	200	87	75	27	M 20	+6 / -12
PKA 4-0	58000	200	250	88	95	27	M 20	+10 / -7
PKA 5-0	97000	250	330	88	125	105	M 24	+8 / -10
PKA 6-0	142000	300	400	90	150	95	M 24	+8 / -11
PKA 7-0	236000	400	500	90	200	130	M 24	+9 / -13
PKA 8-0	355000	500	600	120	255	150	M 30	+13 / -15
PKA 1-4	12000	115	115	60	50	24	M 16	+3 / -4
PKA 2-4	21000	150	150	63	60	23	M 18	+4 / -4
PKA 3-4	38000	200	200	63	75	27	M 20	+5 / -5
PKA 3/72-4	38000	200	200	87	75	27	M 20	+6 / -12
PKA 4-4	48000	200	250	88	95	27	M 20	+10 / -7
PKA 5-4	81000	250	330	88	125	105	M 24	+8 / -10
PKA 6-4	118000	300	400	90	150	95	M 24	+8 / -11
PKA 7-4	197000	400	500	90	200	130	M 24	+9 / -13
PKA 8-4	296000	500	600	120	255	150	M 30	+13 / -15

○ Precision Wedge Mounts, Series PKD (bolt-through)

BILZ precision leveling wedge PKD are used for machines which need to be fixed to a foundation, due their unfavourable stability. Also for machines which must be "squeezed" or "pulled" when being aligned – e.g. for machines with little natural rigidity!

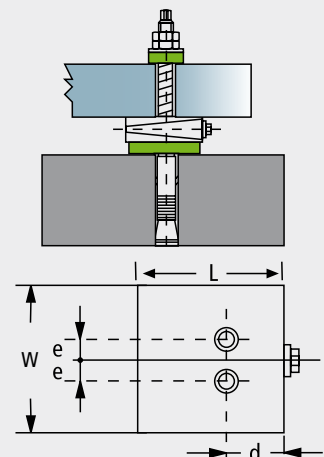
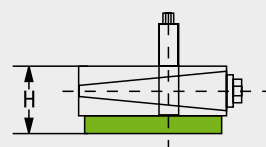
PKD 1-0 bis PKD 8-0

Range of application: drilling and milling machines, machining centers, special machines, long lathes, long planers

Bottom: **Insulating plate BO**

Screws, nuts and anchors can be supplied upon request (page 15).

Notice:
We are always pleased to fulfill special requests!!



type	load N/pc.	L mm	W mm	H in intermed- iate pos. mm	d mm	e mm	bore Ø	range of ad- justment mm
PKD 1-0	15000	115	115	60	50	24	22	+3 / -4
PKD 2-0	25000	150	150	63	60	23	22	+4 / -4
PKD 3-0	47000	200	200	63	80	27	26	+5 / -5
PKD 3/72-0	47000	200	200	87	75	27	26	+6 / -12
PKD 4-0	58000	200	250	88	95	27	26	+10 / -7
PKD 5-0	97000	250	330	88	125	105	26	+8 / -10
PKD 6-0	142000	300	400	90	150	95	30	+8 / -11
PKD 7-0	236000	400	500	90	200	130	35	+9 / -13
PKD 8-0	355000	500	600	120	255	150	35	+13 / -15

With spherical seating **PKAK/PKDK**

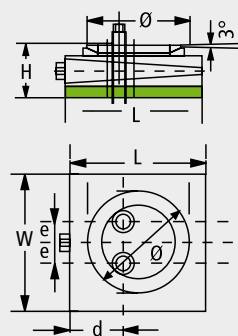
**Precision Wedge Mounts, Series PKAK (bolt-on)
Series PKDK (bolt-through)**

BILZ precision leveling wedge **PKAK / PKDK** are used to compensate angular differences between machines and foundations. Especially for machines with a long bed and high demands in alignment.

PKDK 1-0 up to PKDK 4-0

Range of application: drilling and milling machines, machining centers, special machines, long lathes, long planers

Bottom: **Insulating plate BO**



type	load N/pc.	L mm	W mm	H intermedia- te pos. mm	Ø mm	d mm	e mm	bore / threaded Ø	range of ad- justment mm
PKAK 1-0	15000	115	115	70	110	50	24	M 16	+3 / -4
PKAK 2-0	25000	150	150	78	150	60	23	M 18	+4 / -4
PKAK 3-0	47000	200	200	79	150	80	27	M 20	+5 / -5
PKAK 4-0	58000	200	250	104	150	95	27	M 20	+10 / -7
PKDK 1-0	15000	115	115	70	110	50	24	22	+3 / -4
PKDK 2-0	25000	150	150	78	150	60	23	22	+4 / -4
PKDK 3-0	47000	200	200	79	150	75	27	26	+5 / -5
PKDK 4-0	58000	200	250	104	150	95	27	26	+10 / -7

Precision Wedge Mounts **PKA-AL/PKD-AL**

Aluminium design ranges bolt-on and bolt-through

BILZ precision levelling wedges in a new hard anodised aluminium design (hard coated) are characterised by a high layer density, with a high level of hardness – up to 600 HV, with excellent wear resistance properties. The levelling wedge is easy to adjust and particularly suitable for EMC applications.

Colours: natural colour dark grey

PKA/PKD 1 to PKA/PKD 4 AL

Field of application: for machines in the food and beverage industry, machines for packaging, chemical and pharmaceutical industry. We offer special high-performance models without lubricant for use in clean rooms. Contact us!

Note: All sizes can be supplied with spherical seat compensation. BILZ bonded insulation plates can also be supplied.



type	load N/pc.	L mm	W mm	H intermedia- te pos. mm	d mm	e mm	bore / threaded Ø	range of ad- justment mm
PKA 1-AL	19000	115	115	45	50	24	M 16	+3 / -4
PKA 2-AL	32000	150	150	48	75	24	M 18	+4 / -4
PKA 3-AL	57000	200	200	48	75	27	M 20	+5 / -5
PKA 4-AL	72000	200	250	73	95	27	M 20	+10 / -7
PKD 1-AL	19000	115	115	45	50	24	22	+3 / -4
PKD 2-AL	32000	150	150	48	75	24	22	+4 / -4
PKD 3-AL	57000	200	200	48	75	27	26	+5 / -5
PKD 4-AL	72000	200	250	73	95	27	26	+10 / -7

Precision wedge mounts **PKAE**

In stainless steel

Notice: We are always pleased to fulfil special requests!!



type	load N/pc.	L mm	W mm	H intermedia- te pos. mm	d mm	e mm	inside thread	range of ad- justment mm
PKAE 1-0	15000	115	115	60	50	24	M 16	+3 / -4
PKAE 2-0	25000	150	150	63	60	23	M 18	+4 / -4



Combined Rubber-Airspring Insulator FAEBI®

for shock and vibration insulation of machines,
equipment and sub-assemblies

FAEBI® Product Description

Rubber air-spring for highly, effective insulation of machinery and sub-assemblies against impact and oscillation. The bell-shaped component is made of high-grade elastomer. The construction allows a highly effective insulation without the disadvantage of excessive horizontal deflection. It is impossible for the element to break down as a result of overloading or a sudden drop in pressure. To reduce vertical dampening, the component is available with additional attenuation. The baseplate is equipped with an anti-slip plate so there is no need to anchor the machine to the floor. **Note:** For outdoor use (e.g. isolation of a roof top air condition unit) the FAEBI® can be supplied in **stainless steel** and **EPDM elastomer** version.

FAEBI® mechanical-pneumatic control valves (MPN-LCV)

The mechanical-pneumatic relief valves are a simple yet effective solution. The level is constantly scanned by a plunger. The plunger position is transmitted to a slide valve. Depending on the slide valve position, pressure is applied to the air spring or the inside pressure is reduced. The level can be maintained at an accuracy $\pm 1/10$ mm. Principally three control valves are used. A pressure control valve to limit system pressure to a maximum of 6 bar, water trap to remove vapour and an air filter to remove dust and any foreign bodies from the air supply.

Insulation against Impact and Oscillation

Depending upon the static load, the natural frequency of the elements varies between to 3 – 6 Hz in vertical direction. The ratio between vertical and horizontal natural frequency is 1 – 1,5. Maximum spring deflection during impulse load is approximately 15 mm.

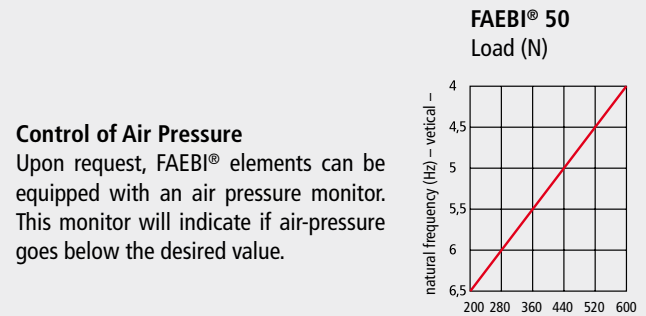
Range of Application

Excellently suited for active insulation of high-speed power presses, forging hammers as well as other machines and equipment with high dynamic forces. Passive insulation of measuring and testing machines as well as high-precision machine tools.

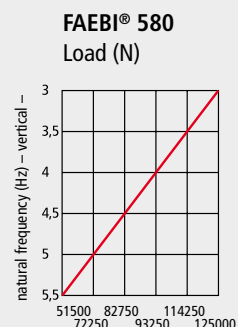
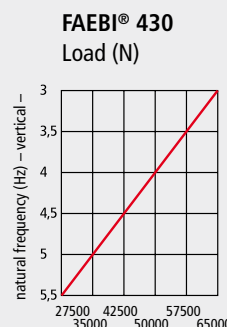
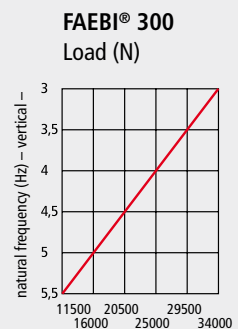
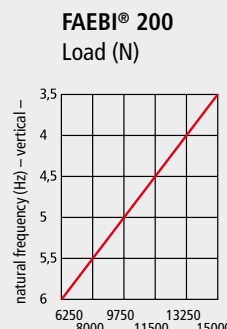
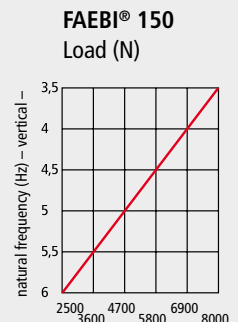
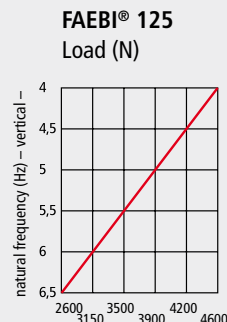
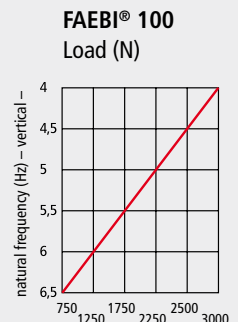
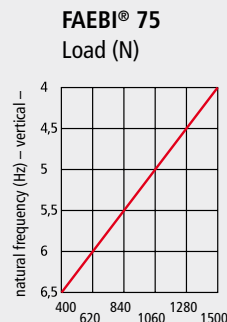
Systems can also be supplied with an option of electronic or mechanical level control! (See page 21)

Assembly

The components are screwed on to the machine by means of pre-drilled holes. It is not necessary to anchor the machine to the floor. The machine is placed on deflated elements which are then inflated to a maximum of 5 – 6 bar via a standard valve. To level the machine, air can either be released or added. The maximum height adjustment available is 10 mm.



Control of Air Pressure
Upon request, FAEBI® elements can be equipped with an air pressure monitor. This monitor will indicate if air-pressure goes below the desired value.



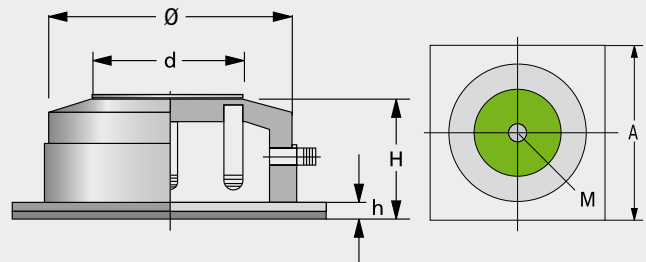
FAEBI® MPN-LCV



Müller-Weingarten
punching machine on
FAEBI® with level control

FAEBI® mechanical-pneumatic control valves (MPN-LCV)

The mechanical-pneumatic relief valves are a simple yet effective solution. The level is constantly scanned by a plunger. The plunger position is transmitted to a slide valve. Depending on the slide valve position, pressure is applied to the air spring or the inside pressure is reduced. The level can be maintained at an accuracy $\pm 1/10$ mm. Principally three control valves are used. A pressure control valve to limit system pressure to a maximum of 6 bar, water trap to remove vapour and an air filter to remove dust and any foreign bodies from the air supply.



Important Notice:

The element must be chosen in such a way as not to exceed the maximum load! Inflation and deflation may be carried out under pressure only! Screw must be screwed in manually – do not use any wrench! Subject to technical changes!

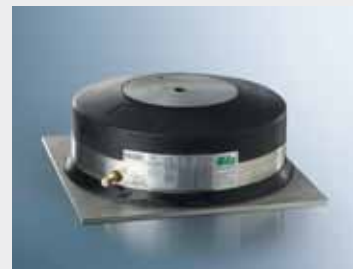
type	load N/pc.	max. pressure/ bar	A mm	Ø mm	H approx. mm = workheight	d mm	h mm	M
FAEBI® 50	200 – 600	3	110	80	60	35	5	M 10
FAEBI® 75	400 – 1500	3	115	97	65	43	5	M 12
FAEBI® 100	750 – 3000	5	135	118	65	60	5	M 12
FAEBI® 125	2600 – 4600	5,5	165	140	90	66	5	M 16
FAEBI® 150	2500 – 8000	6	200	170	90	80	8	M 16
FAEBI® 200	6250 – 15000	6	260	236	90	130	8	M 16
FAEBI® 300	11500 – 34000	6	370	340	90	200	8	M 20
FAEBI® 430	27500 – 65000	6	500	480	90	315	8	M 20
FAEBI® 580	51500 – 125000	6	680	650	99	380	14	M 24

Protective cup:

If the machine base does not cover Ø "d" fully we recommend the use of our special protective cups.

FAEBI® in stainless steel and EPDM-version (outdoor application)

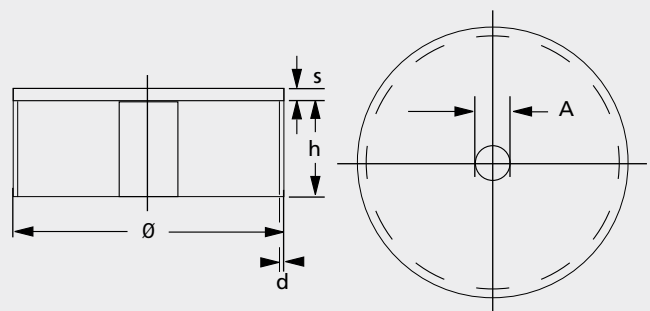
FAEBI® in stainless steel and EPDM-version are especially manufactured for the outdoor application. Machines like air conditioning, compressor, etc can be used outdoors! Price and delivery time upon request.



Protective cup for FAEBI®-Elements

Material: St 37-2 (black primed)

type	A mm	Ø mm	S	h mm	d mm
FAEBI® 100	14	140	5	45	2
FAEBI® 125	18	160	5	60	2
FAEBI® 150	18	190	5	60	2
FAEBI® 200	18	255	5	60	3
FAEBI® 300	22	360	5	60	3
FAEBI® 430	22	500	5	60	4
FAEBI® 580	27	680	10	60	4



Combined Rubber-Airspring-Insulator FAEBI® HD with adjustable dampening

for shock and vibration insulation of machines,
equipment and sub-assemblies



Combined Rubber-Airspring-Insulator FAEBI®-HD with adjustable dampening

Rubber air-spring insulator FAEBI®-HD is made of a combination of high-grade elastomer and metal with an enlarged sidewall. In order to obtain as high a dampening effect as possible, the air space is split into two chambers (load / dampening volume) linked by an air pipe. By the adjustable valve the dampening can be changed easily from outside. Due to the friction caused by the air-stream passing through the bypass valve, it is possible to adapt the dampening to each application.

Because of the very high dampening, the resonance amplitude is much smaller and therefore you are able to achieve less machine movement. (see graph 1a + 1b) Furthermore the increased transformable energy takes effect on the production quality of your machinery.

Note:

In contrast to viscous dampers, the air dampening is absolutely wear-resistant and free of maintenance. Furthermore it is possible to change the dampening from outside.

Optional: FAEBI® mechanical-pneumatic control valves (MPN-LCV)

The mechanical-pneumatic relief valves are a simple yet effective solution. The level is constantly scanned by a plunger. The plunger position is transmitted to a slide valve. Depending on the slide valve position, pressure is applied to the air spring or the inside pressure is reduced. The level can be maintained at an accuracy $\pm 1/10$ mm.

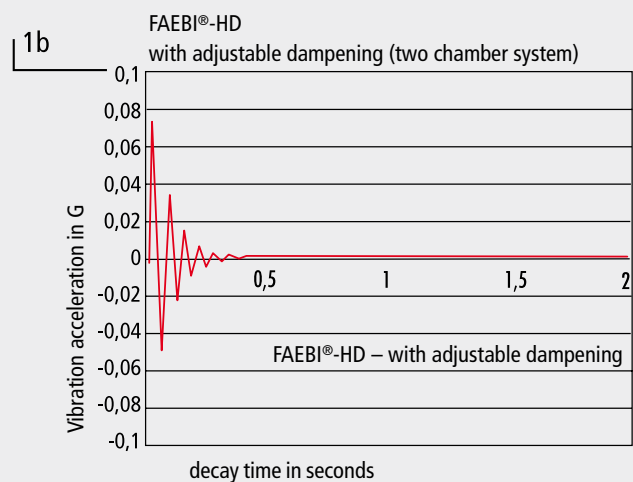
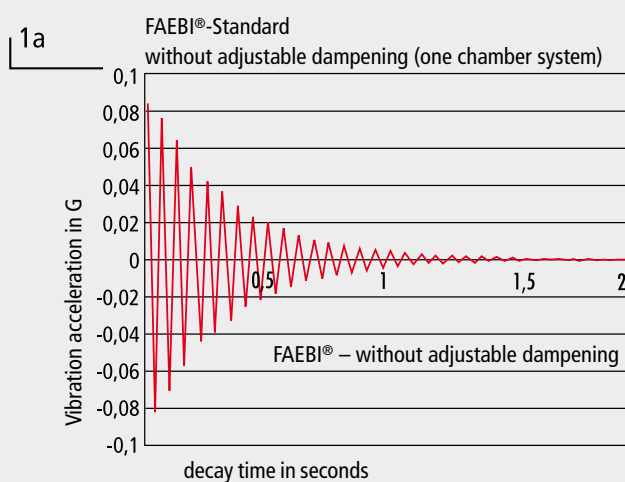
Principally three control valves are used. A pressure control valve to limit system pressure to a maximum of 6 bar, water trap to remove vapour and an air filter to remove dust and any foreign bodies from the air supply.



LCV-valve $\pm 1/10$ mm

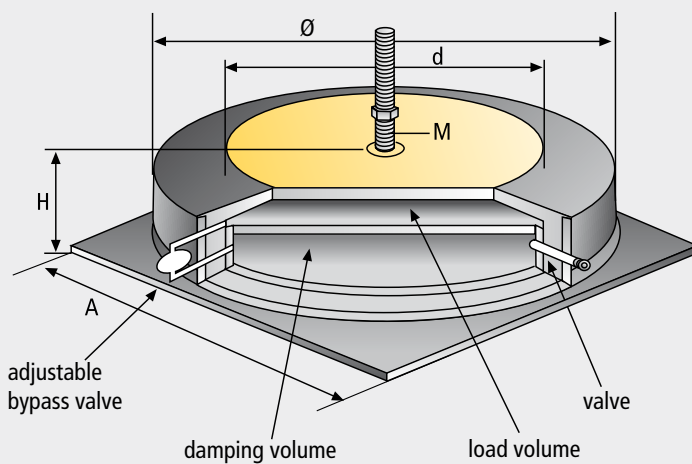


PVM-valve $\pm 1/100$ mm

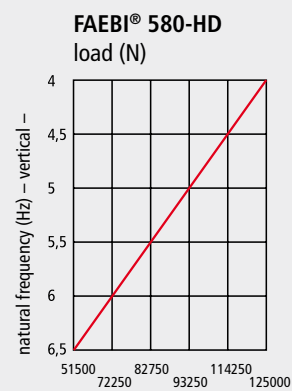
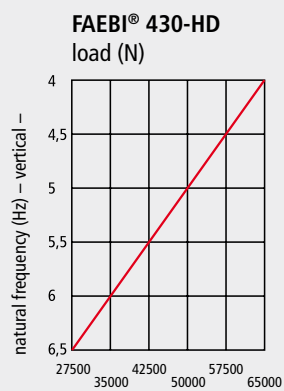
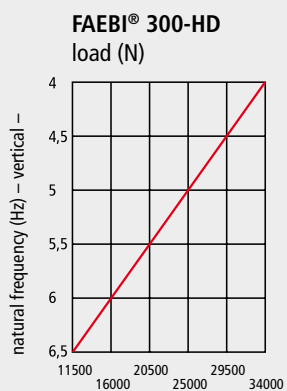
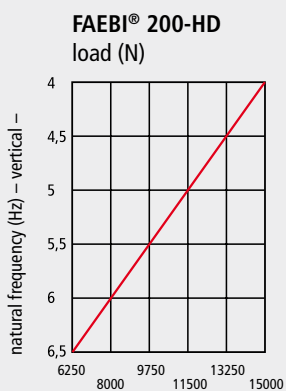




TRUMPF TruPunch 1000 mounted on FAEBI®-HD



type	load N/pc.	max. pressure / bar	A mm	Ø mm	H approx. mm = workheight	d mm	M
FAEBI® 200-HD	6250 – 15000	6	260	236	90	130	M 16
FAEBI® 300-HD	11500 – 34000	6	370	340	90	200	M 20
FAEBI® 430-HD	27500 – 65000	6	500	480	90	315	M 20
FAEBI® 580-HD	51500 – 125000	6	680	650	125	380	M 24





Membrane Air-Spring Insulator BiAir®

with deep natural frequency and adjustable dampening (pat.) for vibration insulation of measuring and testing machines, optical and electronic equipment, laser machines, fine machining plant, vehicle and motor performance testers etc.

BiAir®

Product Description

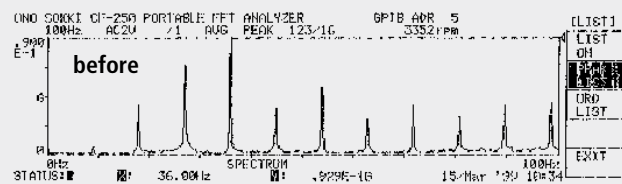
The Air-Spring Insulator **BiAir®** consists of a cast aluminum body whose air volume is enclosed by a thin-walled, flexible and pressure-resistant rolling diaphragm. The piston is seated on this diaphragm and is pushed into the air volume. This design causes highly effective vibration insulation.

In order to obtain as high a dampening effect as possible, the air space is split into two chambers (load/dampening volume) linked by air pipe. By the adjustable valve the dampening can be easily changed from outside. Due to the friction caused by the air-stream passing through the bypass valve, up to 20% dampening can be effected.

Additional safety valves will protect the roller diaphragm from getting damaged by over-inflation.

Range of Application

Highly effective vibration insulation of sensitive measuring and testing machines, fine-machining plant, as well as optical and electronic equipment. Another important range of application is the vibration-insulated foundation of vehicle, motor and other performance testers. **BiAir®** Air-Spring insulators are extremely well suited for the insulation of foundations e.g. equivalent machine loads.



Advantages compared with conventional steel springs

BiAir® Air-Spring insulators with level control are an active system. The machine/foundation level consistency will always be preserved! Automatic leveling/adjustment!

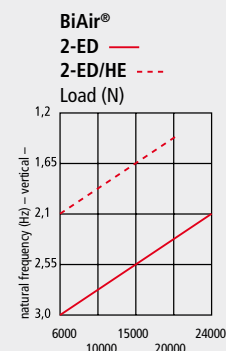
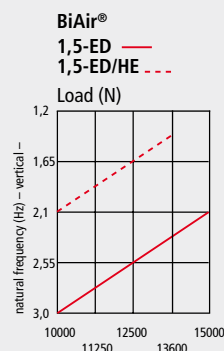
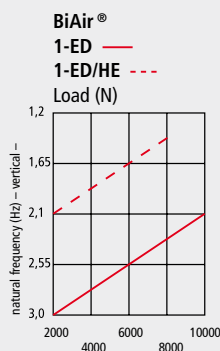
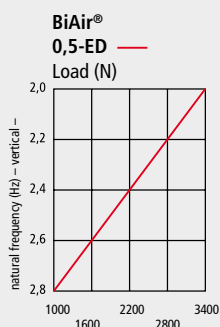
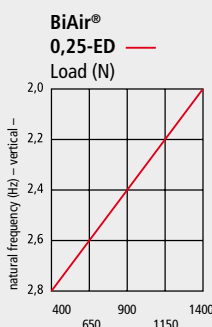
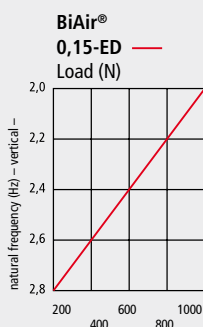
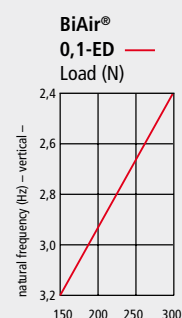
BILZ level controller systems

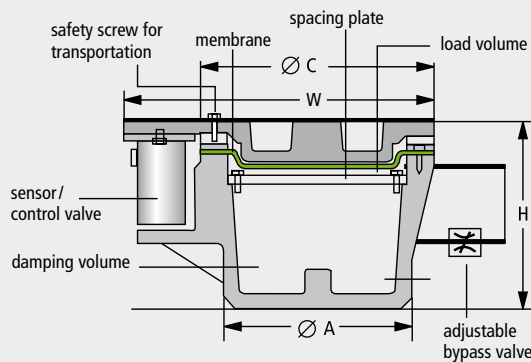
Level control is an important part of an optimally functioning air spring system. The automatic level controller can be utilized to overcome the problem associated with load changes in air-spring insulated machines, which can result in tilting of the machine.

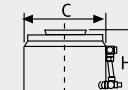
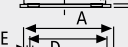
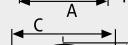
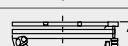
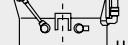
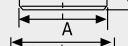
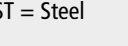
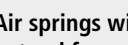
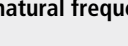
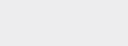
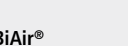
The height of the specific elements **BiAir®** or **FAEBI®** can be controlled by changing the air pressure in the air-spring insulators. Quick inflation or deflation will hold the machines level even if their center of gravity keeps changing.

Control circuit

The circuit consists of at least three air springs. If more air springs are needed for structural or loading reasons, the system must always include 3 position pickups, e.g. three controlled components in order to avoid statical overdefinition. This is achieved by connecting sets of air springs in parallel.



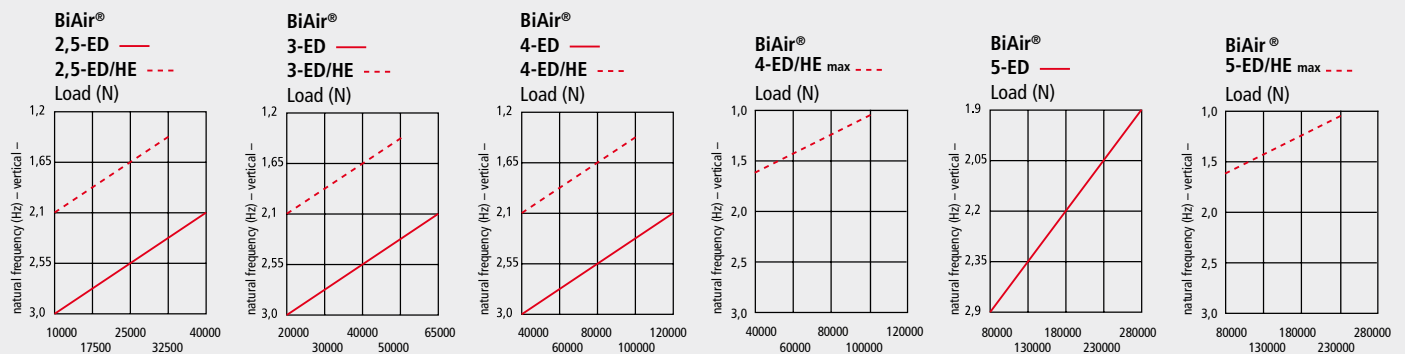


type	Ø A mm	W mm	Ø C mm	workheight H mm	max. load N at max. 4 bar	max. load N at max. 6 bar	natural frequency Hz (vertical) approx.	natural frequency Hz (horizontale) approx.
 BiAir® 0,1 -ED-ST	76	72	72	77	180	270	3	3
 BiAir® 0,15-ED-ST	76	72	72	77	670	1000	2,5	2,5
 BiAir® 0,25-ED-ST	110	182	110	87	1130	1700	2,5	2,5
 BiAir® 0,5 -ED-ST	130	190	129	100	2670	4000	2,5	2,5
 BiAir® 1 -ED-ST	200	275	200	100	6330	9500	2,5	2,5
 BiAir® 2 -ED-ST	260	350	260	100	14200	21300	2,5	2,5
 BiAir® 2,5 -ED-ST	300	390	300	100	19670	29500	2,5	2,5
 BiAir® 0,5-ED	120	216	129	157	2670	4000	2,5	2,5
 BiAir® 1 -ED	172	288	200	157	6330	9500	2,5	2,5
 BiAir® 1,5-ED	212	305	230	157	10170	15260	2,5	2,5
 BiAir® 2 -ED	226	335	260	157	14200	21300	2,5	2,5
 BiAir® 2,5-ED	271	378	300	157	19670	29500	2,5	2,5
 BiAir® 3 -ED	348	467	382	157	34130	51200	2,5	2,5
 BiAir® 4 -ED	490	605	530	157	65730	98600	2,5	2,5
 BiAir® 5 -ED	747	855	798	157	155730	233600	2,5	2,5
 BiAir® 1 -ED/HE	172	288	200	307	6330	9500	1,7	2,5
 BiAir® 1,5-ED/HE	215	305	230	307	10170	15260	1,7	2,5
 BiAir® 2 -ED/HE	226	335	260	307	14200	21300	1,7	2,5
 BiAir® 2,5-ED/HE	271	378	300	307	19670	29500	1,7	2,5
 BiAir® 3 -ED/HE	348	467	382	307	34130	51200	1,7	2,5
 BiAir® 4 -ED/HE	490	605	530	307	65730	98600	1,7	2,5
 BiAir® 4 -ED/HE-Max	490	605	530	509	65730	98600	1,1	2,5
 BiAir® 5 -ED/HE-Max	718	960	880	509	155730	233600	1,1	2,0

ST = Steel

When choosing the size of the air-spring consider loading at 4 bar only.

Air springs with higher max. loads as well as air springs with lower natural frequencies can be supplied upon request!





Membrane Air-Spring Insulator BiAir®

with level controller system

● BiAir® mechanical-pneumatic positioner / controller (MPN-PVM)

The mechanical-pneumatic relief valves are a simple yet effective solution. The level is constantly scanned by a plunger. The plunger position is transmitted to a spool valve. Depending on the spool valve position, pressure is either applied to the air spring or vented from the inside of the air spring. The machine level can be maintained at an accuracy $\pm 1/100$ mm.

Principally three control valves are used. The incoming air supply is conditioned with a pressure regulator to limit system pressure to a maximum of 6 bar and with a water trap to remove vapor and an air filter to remove dust and any foreign bodies from the air supply.



System components

Each system consists of 3 position sensors, 3 electro-pneumatically relief valves, one control unit (digital computer logic), the air-supply regulator and filter units.

Even the most severe conditions are mastered by the electro-pneumatically positioner. It is used mainly where high reset precision and extremely short reaction times are required.

Any deviation (difference between desired value and actual value) from the desired height (desired value) of the air spring insulators is measured at a precision of up to $1/100$ mm accuracy by means of position sensors.

In the control unit, these electronic signals will then be processed and the air spring elements will be inflated or deflated accordingly for level equalisation via the pneumatic relief valves.

● BiAir® electro-pneumatic positioner/controller (EPN)

Advantages

Important advantages of the BILZ level control are:

- a high reset accuracy e.g. level accuracy of $\pm 1/100$ mm
- extremely short reaction time (within the milli-second range)
- the general possibility of being able to optimally adapt (increase and reset) the speed of the system to the specific conditions (control circuit)
- wear-resistant and sturdy relief valves
- simple and effective set-up operation
- For highly-dynamic machines with high precision requirements, we recommended the new **EPN – FAST**, which can handle very high volume flows and is fitted with frictionless embedded valves.

Control unit

The control unit consists of a printed circuit board, containing the entire logic of the 3 control circuits, 3 air pressure displays for the air springs, adjusting screws for the adjustment of the machine, selection of the controller speed, and a switch to enable complete deflation of the air springs. The control unit can be supplied either as a 19 inch rack mount unit or completely enclosed within a cabinet.

Software

As an optional feature, a special software package is available. By means of this software, the adjustment and optimization of controlled conditions, the registration of adjustment parameters as well as error determination can be carried out via the serial interface (serial interface provided on the control unit).

Furthermore, the integrated serial interface enables link-ups with available machine computers or systems to be insulated. A number of more complex system modes can be realized this way.

LTH Insulated Tables

with Air-Spring Insulators and Automatic Level Controller



● LTH-Insulated Tables

Plate: Granite

Product Description

Adjustable feet, torsion proofed, welded steel frame, membrane air-spring insulators BiAir® (vertical natural frequency approx. 2.3 Hz) between frame and plate, mechanical-pneumatic level control (level accuracy of $\pm 1/100$ mm or $\pm 1/10$ mm).

Plate in granite (LTH).

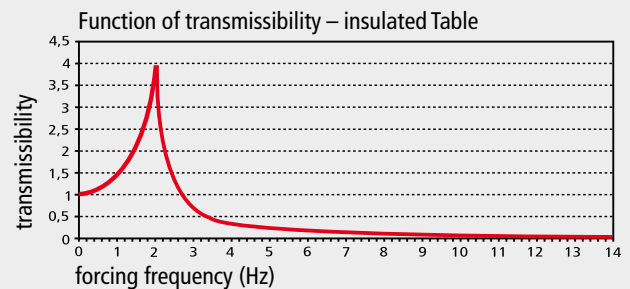
Range of Application

Vibration sensitive measuring and testing machines, laser, scales, optical and electronical as well as medical equipment.

The new insulated table LTH is used for all applications where vibrations or load changes may disturb the experiment or machine.

Technical

BILZ insulated table LTH is a vibration insulated workplace. Vibration of the surrounding area is insulated by high efficient membrane air springs. The level controller (mechanical-pneumatic valves) will maintain a level accuracy of $\pm 1/100$ mm or $\pm 1/10$ mm automatically even while the loading may change. An air regulator with water trap and air filter is included. As standard the insulated table is available in 3 different sizes. We are always pleased to fulfill custom made sizes and colours. The work surface of the table can be delivered in granite (LTH).



Standard Sizes

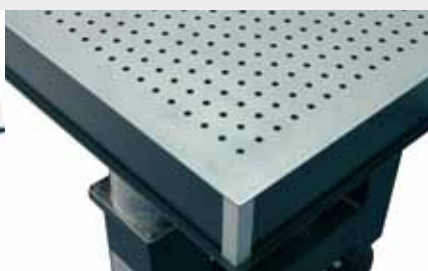
sizes	LTH 60-50	LTH 100-63	LTH 90-75	LTH 100-80	LTH 100-100	LTH 150-100	LTH 200-100
width	600 mm	1000 mm	900 mm	1000 mm	1000 mm	1500 mm	2000 mm
depth	500 mm	630 mm	750 mm	800 mm	1000 mm	1000 mm	1000 mm
thickness	100 mm	100 mm	100 mm	140 mm	160 mm	190 mm	220 mm
hard stone							
height	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm
max. loading	2500 N	3200 N	3200 N	7000 N	7500 N	18000 N	28000 N
capacity							

Other dimensions can be supplied upon request!



Research workstation with optical equipment

● LTH Insulated Tables



Basic set-up of an optical table model LTO

BILZ workstations are characterized by high-end quality and functionality.

Product description:

Adjustable feet. – torsion proofed, welded steel frame.

- Membrane air-spring insulators BiAir® between frame and plate. Other insulators on demand.
- mechanical-pneumatic positioner/controller (level accuracy of $\pm 1/100$ mm or $\pm 1/10$ mm)

Range of application

- set-up of optical laser systems, – interferometer
- special microscopy

Optical Table Top

HD steel honeycomb core with high natural damping, cover plate **without** thread insert.

HDT steel honeycomb core with high natural damping, cover plate **with** thread insert.

Description of construction

Cover plate: stainless steel 3 mm / magnetic or magnetic / bloomed

Base plate: steel plate 3 mm

Thread insert: M6 (HDT)

Core: (HD/T) steel honeycomb core with a 0.5 mm galvanized steel plate, precision formed / bonded with special resin

Thread inserts: floating bedded thread inserts M6 / no connection to the table core through closed sleeves / adjustment of turnbuckles about 5 mm during simultaneous addition about ± 3 degrees are possible / Max. depth of thread 30mm

Optical workstations provide optimal damping and rigidity at a low weight.

The damping properties of the **BILZ LTO honeycomb lattice boards** have been optimized. High amplitudes at resonance, typically in high frequencies ranges, will be almost completely eliminated the HD-series table by the high internal damping coefficient.

Standard Sizes LTO

sizes	LTO 60-50	LTO 90-60	LTO 120-60	LTO 150-90	LTO 200-100	LTO 240-120	LTO 300-150
width	600 mm	900 mm	1200 mm	1500 mm	2000 mm	2400 mm	3000 mm
depth	500 mm	600 mm	600 mm	900 mm	1000 mm	1200 mm	1500 mm
thickness	100 mm	100 mm	100 mm	100 mm	200 mm	200 mm	300 mm
hard stone							
height	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm
max. loading	1500 N	2000 N	3000 N	5000 N	5000 N	7500 N	7500 N
capacity							

Other dimensions can be supplied upon request!

LTH Insulated Tables

with Air-Spring Insulators and Automatic Level Controller



● LTH-S Tables / Special models

Special dimensions:

It's possible to supply special dimensions, higher loads, stainless steel solutions or a high-end solution with the BILZ AIS system available upon request.

Range of application

Vibration insulation of optical and opto-electronic working stations and small, high precision table top measuring instruments, e.g. roundness testers, gear measuring machines, surface measuring machines, etc.

General system properties

Vertical natural frequency: approx. 1.5 Hz

Horizontal natural frequency: approx. 2.5 Hz

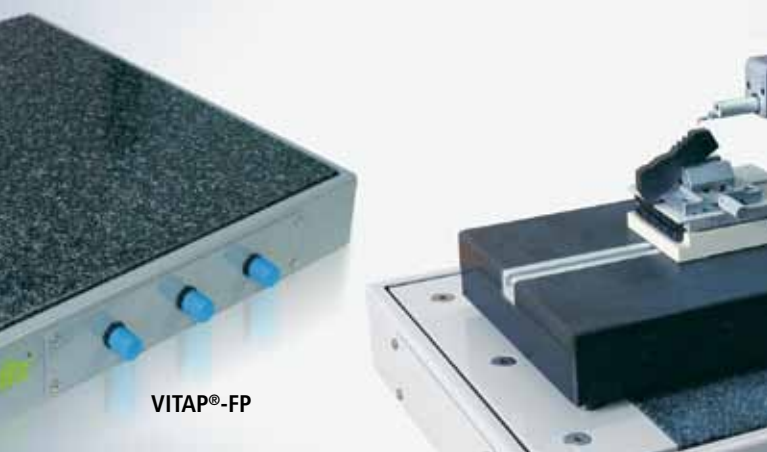
- adjustable feet, caster wheels
- Torsion proofed, welded steel frame with integrated BiAir® air-spring in the table-leg
- mechanical pneumatic level control (level accuracy of ± 0.01 mm) and a pneumatic service unit



Zeiss roundness measuring machine



Special Model in stainless steel



VITAP®-FP

BILZ-VITAP® Vibration Isolated Table Top Platforms

Product description

BILZ-VITAP® – Vibration Isolated Table Top Platforms. These light-weight platforms consist of a robust, powder coated metal enclosure with either three or four integrated low natural frequency BILZ rubber air springs FAEBI® or the even lower natural frequency BILZ membrane air springs BiAir®. Platforms are available with or without a levelling system; automatic or manual levelling systems are available. Standard platforms are supplied with a granite top which provides a polished surface with high mass and stiffness.

Mechanics

VITAP®-F

Efficient BILZ-FAEBI® rubber air springs with non-return valve.

VITAP®-FP

Efficient BILZ-FAEBI® rubber air springs, levelling is manually controlled by adjusting the air pressure with three precision air pressure regulators.

Application / Usage

These platforms are designed for a wide range of applications with loads from 1 kg to 150 kg. These include visual devices, light microscopes, microscopes with CCD camera, inspection microscopes, small surface and roundness testers, lab and measurement rooms as well as semi-clean rooms. They are also well suited for portable use.

VITAP®-BM

Effective BILZ-BiAir® membrane air springs, levelling is automatically controlled (self levelling) by three mechanical-pneumatic level controllers. Automatic reset levelling after load change within +/- 0.1mm.

VITAP®-BC

The special design of the VITAP®-BC is of particular benefit to microscope workstations, thanks to the low height of the unit to be stored as a result of its hook-on design, as well as the additional comfortable armrests.

	platform box dimensions	surface dimensions	height vertical approx.	payload	natural frequency	compressed air supply
VITAP®-F 50-40	540 x 440 mm	500 x 400 mm	90 mm	10 - 500 N	4,5-6 Hz	self-contained / pneumatic pump
VITAP®-F 60-50	640 x 540 mm	600 x 500 mm	90 mm	10 - 500 N	4,5-6 Hz	self-contained / pneumatic pump
VITAP®-FP 50-40	540 x 440 mm	500 x 400 mm	90 mm	10 - 500 N	4,5-6 Hz	4 bar compressed air net
VITAP®-FP 60-50	640 x 540 mm	600 x 500 mm	90 mm	10 - 1500 N	4,5-6 Hz	4 bar compressed air net
VITAP®-BM 50-40a	540 x 440 mm	500 x 400 mm	90 mm	10 - 350 N	1,8-3 Hz	6 bar compressed air net
VITAP®-BM 50-40b	540 x 440 mm	500 x 400 mm	90 mm	35 - 600 N	1,8-3 Hz	6 bar compressed air net
VITAP®-BM 60-50a	640 x 540 mm	600 x 500 mm	90 mm	10 - 600 N	1,8-3 Hz	6 bar compressed air net
VITAP®-BM 60-50b	640 x 540 mm	600 x 500 mm	90 mm	600 - 1500 N	1,8-3 Hz	6 bar compressed air net
VITAP®-BC 60-50b	640 x 540 mm	600 x 500 mm	90 mm	600 - 1500 N	1,8-3 Hz	6 bar compressed air net



VITAP®-F



VITAP®-FP

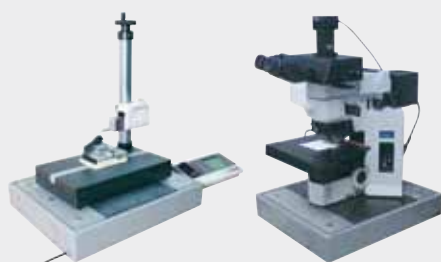


VITAP®-BM



VITAP®-BC

Examples



Test stands

● Vibration insulation of automobile test stands

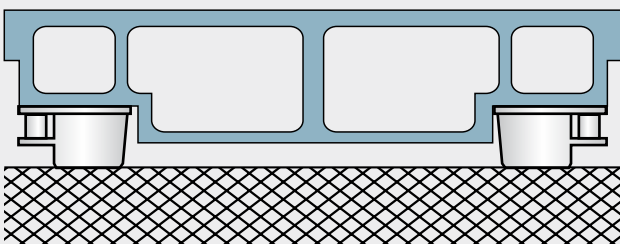
In recent years, ever higher requirements of test stands and test systems for the automobile industry have led to the need for improved performance of vibration isolation systems. BILZ air-springs with level control systems are ideally suited for this demanding application.

BILZ services:

- interpretation and supply of the vibration isolation system
- supply and installation of cast-iron plates to customer's request
- installations & commissioning of the vibration isolation system

Experience of many years has BILZ in the vibration insulation of:

- engine test stands
- swiveling test stands
- **formula 1 test stands**
(BMW, Daimler Chrysler, Ferrari, Toyota, Renault)
- gearing test stands
- acoustic engine test stands
- acoustic roll test stands
- shaker
- sliding tables
- cylinder test stands
- special test stands
- hydraulic pulsating machines
- heavy shaker test stands
- road simulation test stands



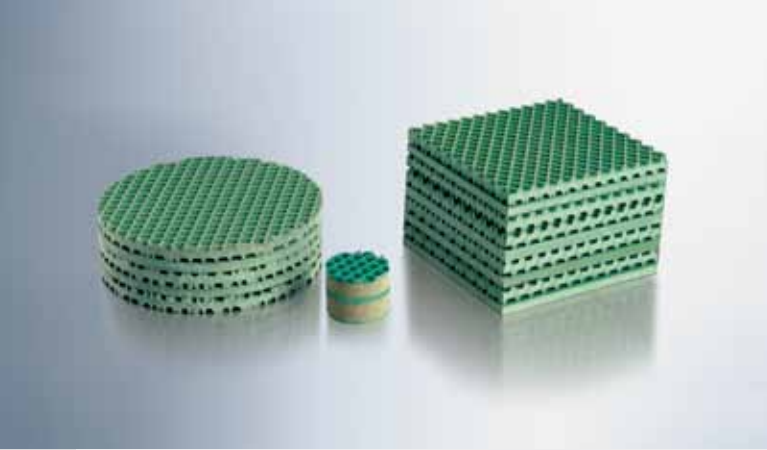
● Isolated foundations for special test stands

During the vibration insulation of test stands and aggregates with high dynamic forces additionally a seismic mass is needed.

BILZ services:

- interpretation and supply of the vibration isolation system
- preparation of statics and building plans for the foundation recess and the block itself
- raising of foundation blocks
- supply and assembly of cast-iron plates
- start-up of the vibration isolation system
- simulation
- frequency analysis and vibration measurements





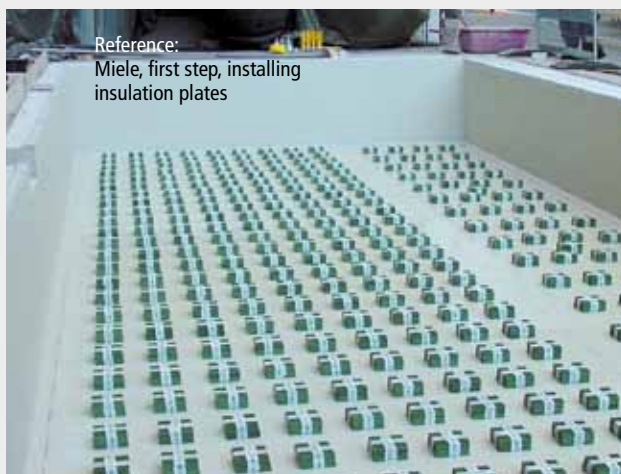
Insulation Plate Sets

Sets of insulating plates

By using multiple layers of insulating plates it is possible to reach a very low natural frequency which enhances the isolation in comparison with single insulating plates. In particular these sets of plates are ideal for big machines and vibration isolation foundations. Even with a long lasting dynamic load, the high developed material holds its isolation properties. BILZ Isolation plates are resistant against oils, fats, coolant, acids, bases and cleaners.

Application / Usage

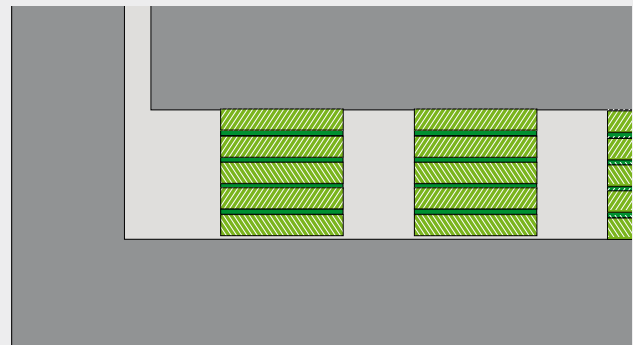
Effective isolation of highly dynamic machines and foundation isolation.



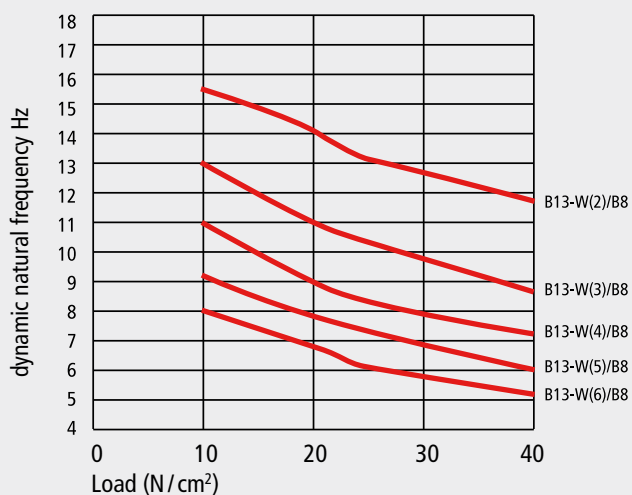
Standard sizes

type	Free height in mm	dynamic natural frequency vertical (Hz)	dynamic natural frequency horizontal (Hz)
B13W/B8 2-point	34	12	4
B13W/B8 3-point	55	9	3
B13W/B8 4-point	76	7	3
B13W/B8 5-point	97	6	2
B13W/B8 6-point	118	5	2

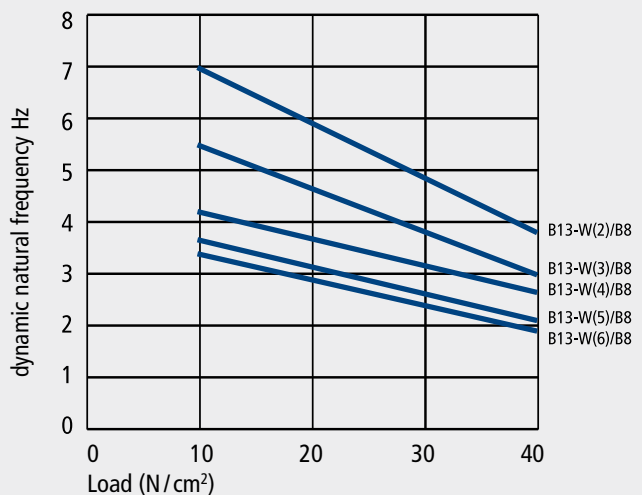
The permissible load capacity of a plate set is between 5 and 40 N/cm², depending on the application. The dimensions and the number of isolation layers will be determined by BILZ depending on the application. Our sales representatives will be happy to take on the design and provide advice in person..



dynamic natural frequency vertical

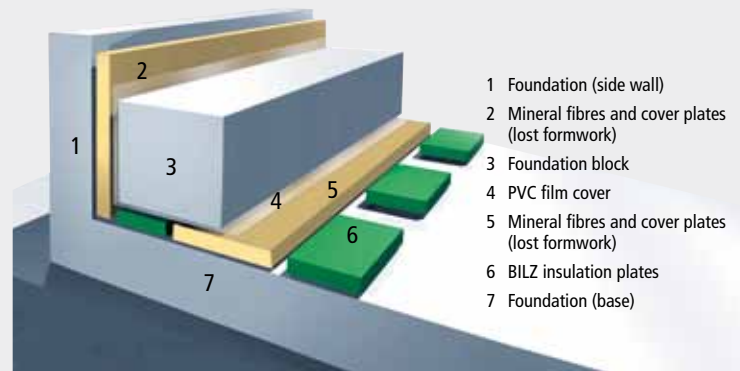


dynamic natural frequency horizontal



Isolated Foundations

Example: Foundation insulation with insulation plate sets and lost form work



● BILZ insulating plates are ideally suited for vibration suppression of foundations and baseplates

The main purpose of the foundation is to stabilize the machine as well as to increase the moment of inertia. The foundation thus positively influences machine vibration by reducing the amplitude of oscillation. It is wrong, however, to assume that any foundation large enough would eliminate all vibration problems. It is important that as much information as possible be supplied regarding the machine to be isolated, this will include machine size and weights, any dynamic features of its operation, location including ground type, condition where optimal performance is required and a vibration analysis of the machine and site conditions. A correct isolation between machine foundation and the surrounding area will result in trouble free operation.

As a result of years of experience we have the necessary experience in this field. At your request we can offer all other related services including measuring of vibrations, planning and construction design.

Application below:

Due to technological advances in concrete construction (prefabricated concrete slabs, improved formwork techniques), the technically superior solution of isolation without the use of mineral fibre fillings is increasingly being adopted.



Precast form, steel mould

"Lost form working technology"



Application above:

Application example in the plant of a major automobile manufacturer. Passive insulation protection of a Waldrich-Coburg portal milling machine from the pressing mechanism sector. Total mass: approx. 1200 to.

Illustration 1, 2, 3: Depositing of BILZ insulation plates (green) and padding of the spaces with mineral fibre insulation plates (sacrifice formwork). Illustration 4: Covering of the entire area first with PVC sheeting as used for construction work, and then with mineral fibre cover plates. All joints must be pasted/glued together.

Illustration 5, 6: Mounting of reinforcement. Illustration 7, 8: Filling in of concrete.



Foundation Insulation with FAEBI and Level Control System and prefabricated concrete slab

Example: Stamping Machine Type PIVATIC PCC80 TTI + HT

Machine weight inclusive work piece app. 23 to. Dynamic vertical forces app. 60 KN, horizontal forces app. 30 KN, Foundation block: app. 5.1 x 3.5 x 1 m, weight app 40 to.

BILZ® Equipment:

8 x BILZ®-FAEBI® 580 HD with mechanic level control system LCV and following services:

- foundation design
- static foundation calculation
- formwork plans
- steel- and bending schedule list

Special request:

Target: loss of production not longer as 3 weeks. Small space from the revision channel trough to foundation block.

Very low horizontal movement of the machine was excepted. Efficiency of the isolation of more than 80 % was requested.



Foundation Insulation with BiAir® and Level Control System and prefabricated concrete bloc

Example: Grinding machine Type GLEASON PFAUTER P 1200 G

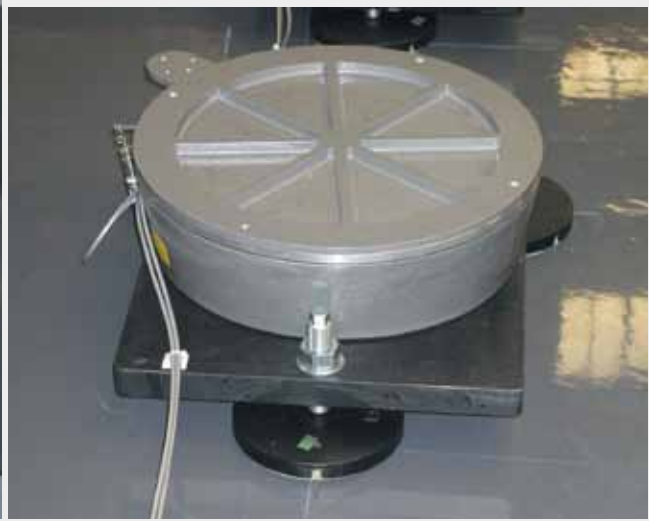
BILZ® Equipment:

Vibration isolated Inertia Block app. 20 to. On BILZ Membrane – Air-spring System BiAir® 4-ED with mechanic pneumatic level control system MPN-LCV-HF.



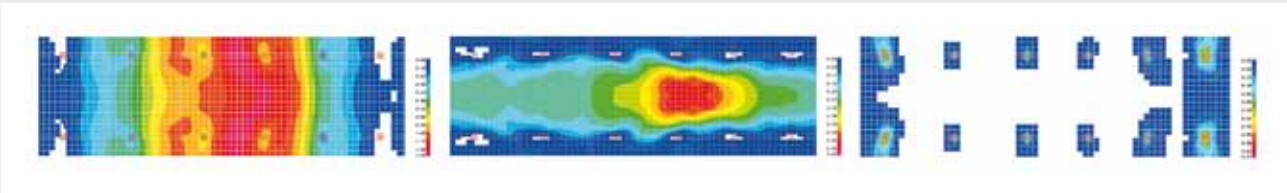
Special request:

Because of surrounding machines, overhead crane etc. installation of an isolation system is difficult. Workpieces with app. 10 to. Creates a large change in loading on the isolation system. To compensate this, a high flow level control system with level accuracy of 0.1 mm is needed.

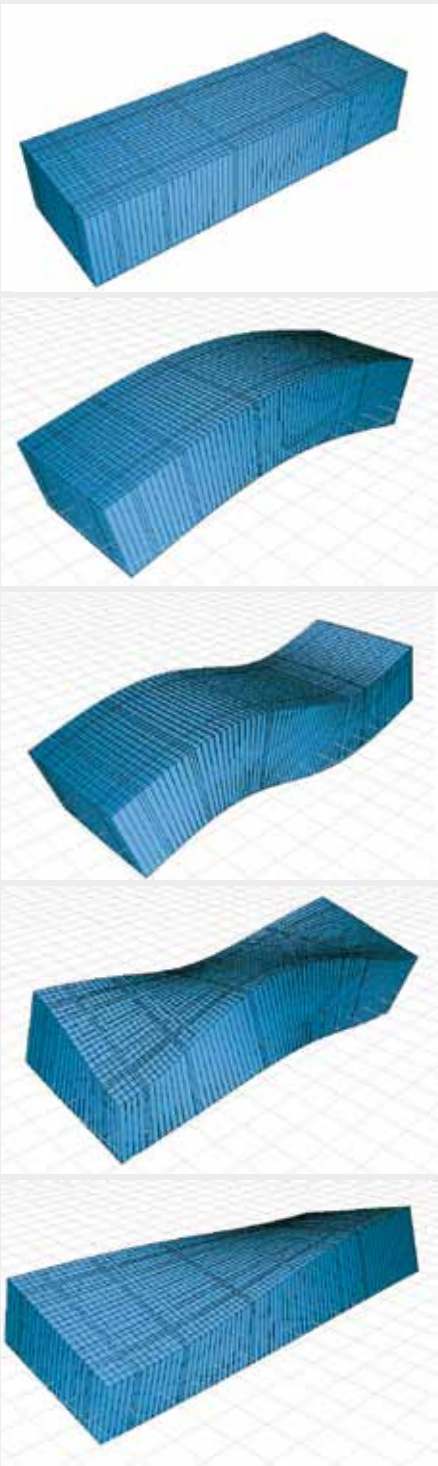


Static and dynamic calculations / formwork and reinforcement plans / FEM analyses

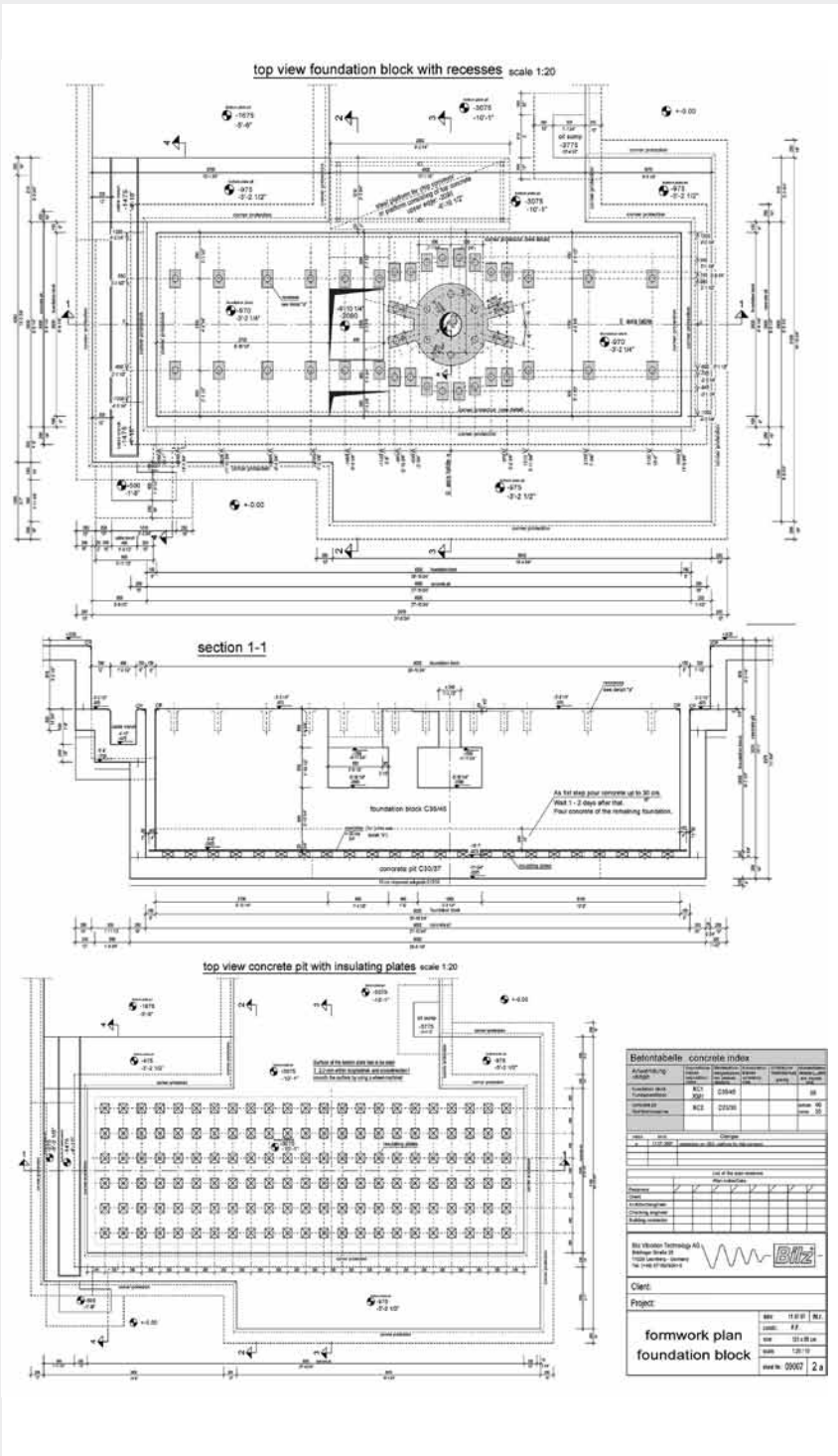
Example: FEM representation.
Bend reinforcement in nodal points.



Example: FEM representation
of Foundation Block / natural forms



Example: construction plan for
foundation isolation with insulation plate sets



Vibration and structure-borne noise isolation of research laboratory

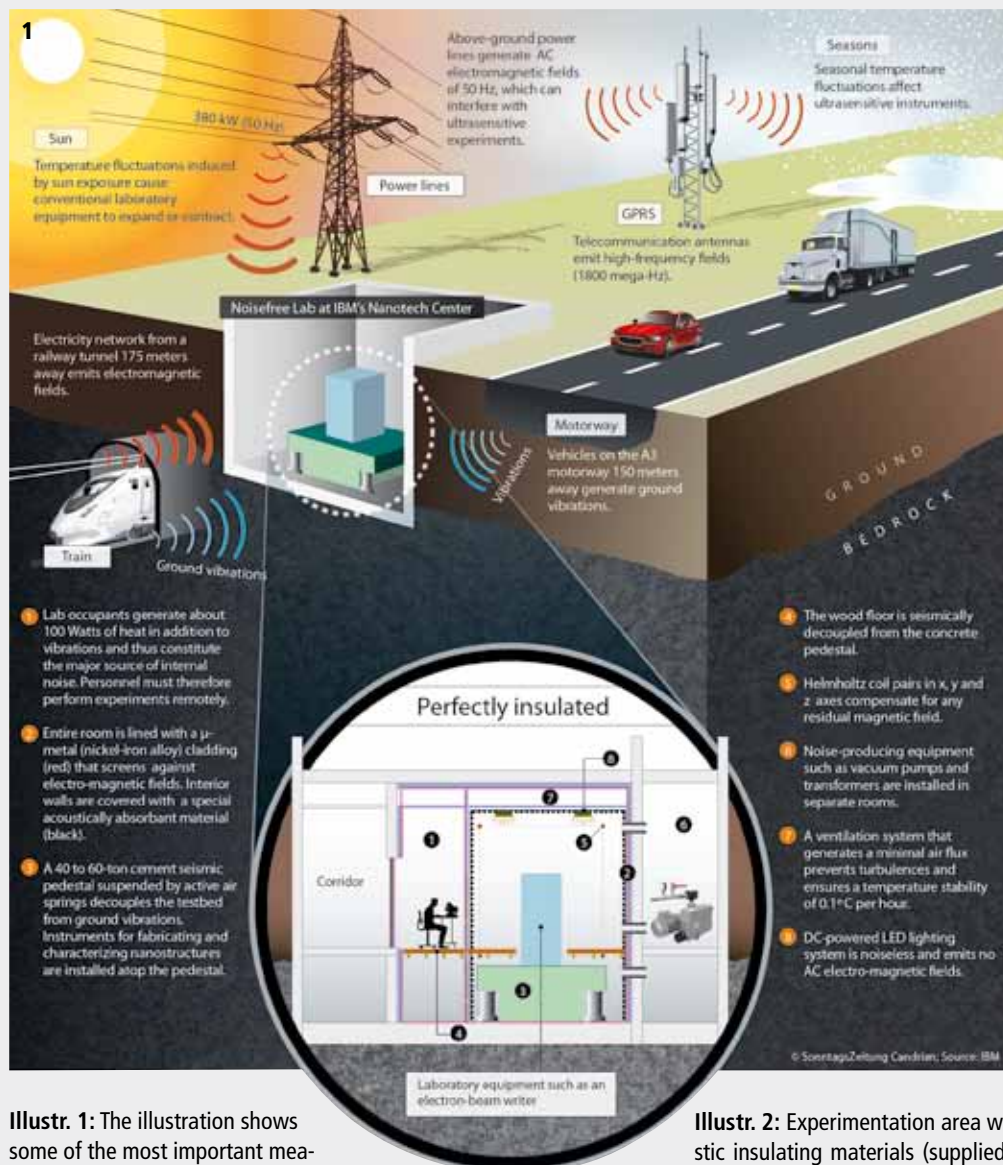
AISTM
Active Isolation System

The manufacture and characterisation of ever smaller components, including structures consisting of just a few molecules or atoms, poses a huge challenge in terms of the vibration isolation required to protect the vibration-sensitive facilities.

In order to precisely carry out sensitive experiments and measurements on a scale of nanometres (1 nanometre = one millionth of a millimetre), external disturbances, such as fluctuations in temperature, humidity and air pressure, noise, electromagnetic fields and ground vibrations must be kept to a minimum. BILZ Vibration Technology AG has developed international expertise as a professional partner in providing solutions such as lab isolation (foundation block or platform isolation) or direct isolation of highly-sensitive machines (installation of isolation systems in facilities / equipment).

Passive membrane air springs, air bearings or active vibration isolation systems are used to provide high-quality vibration isolation. Depending on customer requirements, BILZ can also create the complete foundation block or platform design, or help with the layout and structural integration of the isolation system into the machine. We are very proud to have equipped the most modern research labs in the world with sound and vibration isolation, such as the "Präzisionslaboratorien MPI Stuttgart" (Precision Laboratories) and the "Noise-Free Labs" of the Binnig and Rohrer Nanotechnology Centre (IBM/ETH Zurich).

In the semiconductor industry, many famous companies such as Applied, Vistec and Zeiss number among our valued customers.



Illustr. 1: The illustration shows some of the most important measures for reducing external disturbances in the "Noise-Free Labs" of IBM and ETH Zurich's Binnig and Rohrer Nanotechnology Centre.



Illustr. 2: Experimentation area with 4.2 m of clearance and acoustic insulating materials (supplied and installed by BILZ). Source: Binnig and Rohrer Nanotechnology Centre (IBM Research – Zurich)



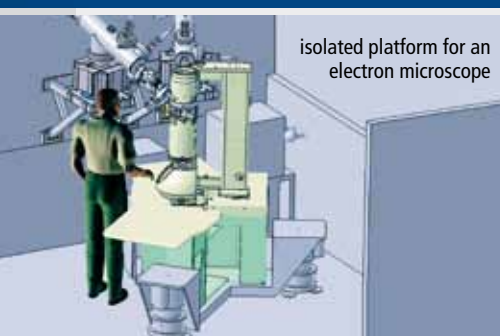
Illustr. 3: AISTM active vibration isolation from BILZ, which suspends the 75-tonne foundation block, with glass-fibre plastic reinforcement, on an air cushion. Source: Binnig and Rohrer Nanotechnology Centre (IBM Research – Zurich)



ComPASS PRO Wafer inspection machine



Lab table with active isolation



isolated platform for an electron microscope



BILZ test facility

Active Isolation System AIS™

- Active electro-pneumatic vibration isolation providing control in six degrees of freedom.
- Optimal vibration isolation performance without any amplification at resonance.
- Excellent level accuracy in both the vertical and horizontal plane.
- Minimal deflection and settling time after an acceleration or deceleration of a moving mass within the machine, shorter settling times equals greater machine throughput.
- Very efficient realtime control.
- PLC, CAN-Bus, one Controller and one High Speed electro-pneumatic servovalve for each degree of freedom.
- Each Controller consists of a microprocessor and integrated, high resolution sensors for position, air-pressure and acceleration.
- Easy-to-use, intelligent WinSNI-Software for setting up and optimizing the AIS™ and for providing system diagnostics.
- Two different modes of operation can be selected simply using a digital I/O. For example, scanning mode (during sensitive machine operations) to loading mode (during moving mass within the machine).
- Feedforward-signal is not required from the machine controller.
- No disturbing heat generation, magnetic variations or high electrical power consumption as by electromagnetic actuators / linear motors.

Range of application

Optimal vibration isolation performance for machines with high dynamic forces that are performing sensitive measurements and inspections, lithography equipment, laser machines, high resolution electron microscopes and machinery for the semiconductor industry. The AIS™ is utilized when the efficiency of isolation and the settling time of conventional air-springs with electro-pneumatic leveling systems is insufficient.

AIS™ has two primary functions:

One function is to protect the precision machine from floor vibration. The other primary function is to improve the performance of the machine by minimizing structure borne vibration created by the high dynamic forces produced during an acceleration or deceleration of a moving mass within the machine. In addition, settling time is reduced which minimizes the delay time before the machine can start performing its sensitive operation.

Controller SPC-LC

Acceleration sensor
(resolution 8 μg)

RS232 Diagnose und
Updates

Sensor for position
(resolution 0.2 μm)





The AIS™ consists of a PLC, CAN-Bus, 16 bit-Controllers, High Speed electropneumatic servovalves and BiAir air springs and/or HAB™ horizontal air springs. A range of sizes are available for both the vertical and horizontal air springs. One 16 bit-controller and one High Speed electro-pneumatic servovalve is used for each air spring or group of air springs. The AIS™ works with a minimum of 3 groups (degrees of freedom) to a maximum of 6 groups (degrees of freedom).

The 16 bit-controller can be mounted directly to the air-spring itself or to the machine, in the same direction as the isolator motion. Located Inside the 16 bit-controller is a microprocessor, a position sensor (resolution 0,2 µm), an acceleration sensor (resolution 8 µg) and an air-pressure sensor (resolution 0,2 mbar). The signals from each of these sensors will be sampled at the rate of 4 kHz.

Since each 16 bit-controller has a microprocessor with specially developed control algorithms along with a special high dynamic pneumatic servo valve, the resulting performance is a very efficient realtime control and no feedforward signal is required.

The 16 bit-controllers are connected by a CAN-BUS to the PLC.

The PLC can be connected to a PC by a standard RS-232 for initial set-up and diagnosis. The primary function of the PLC is to manage and watch over the 16-bit controllers. In addition, the PLC has digital Inputs and Outputs. For example, Ready, Motion Complete, Inspection of Position, Pressure and Power Supply, Switch over from Scanning Mode to Loading Mode, Emergency Stop.

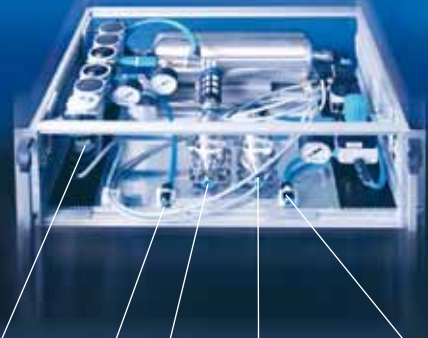
The PLC also provides the possibility to switch from scanning mode to loading mode by using a digital I/O. The PLC takes care of downloading all of the necessary parameters to each 16 bit-controller to achieve the two different modes. The advantage of providing two different modes is the performance of the system can be optimized for each mode. For example, during scanning mode when machine is performing sensitive operations the system should be very soft and not be very aggressive otherwise forces created by the isolation system can affect the machine performance. During loading mode, level accuracy and shortest possible settling times are the most important factors and a very stiff, fast and aggressive system will provide the best performance.

Controller 19" PLC-A1



Power Air-supply CAN Control WinSNI E/A Acknowledge error Control panel FED 50

Air-supply 19" AirBox-A1



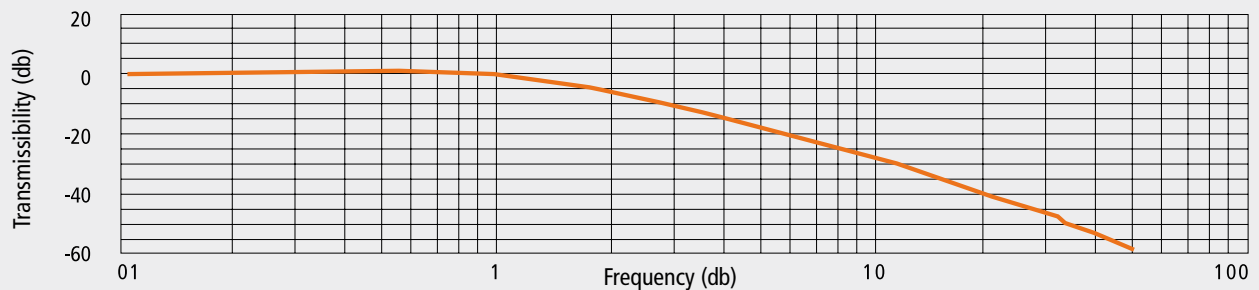
Air-supply Exhaust Valve horizontal Valve vertical Air-bearings

w / h / d / 483 x 133 x 348 mm

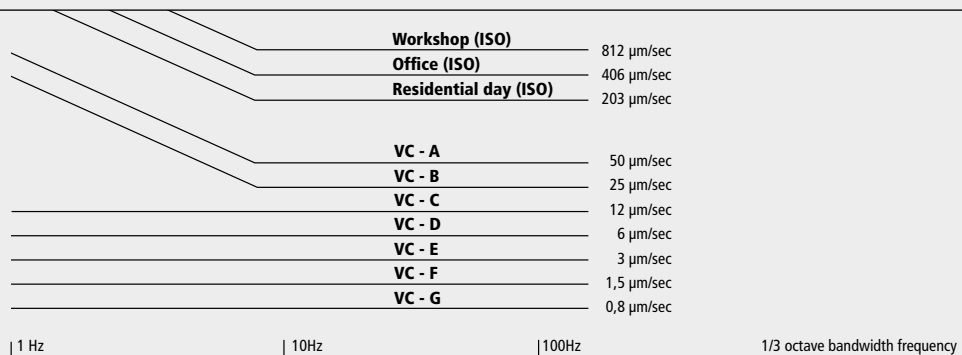
w / h / f / 483 x 177 x 348 mm

Transmissibility of new active BILZ controller at scanning mode with membrane air-springs **BiAir®/HE** and horizontal air-bearing **HAB™** with 6 controllers.

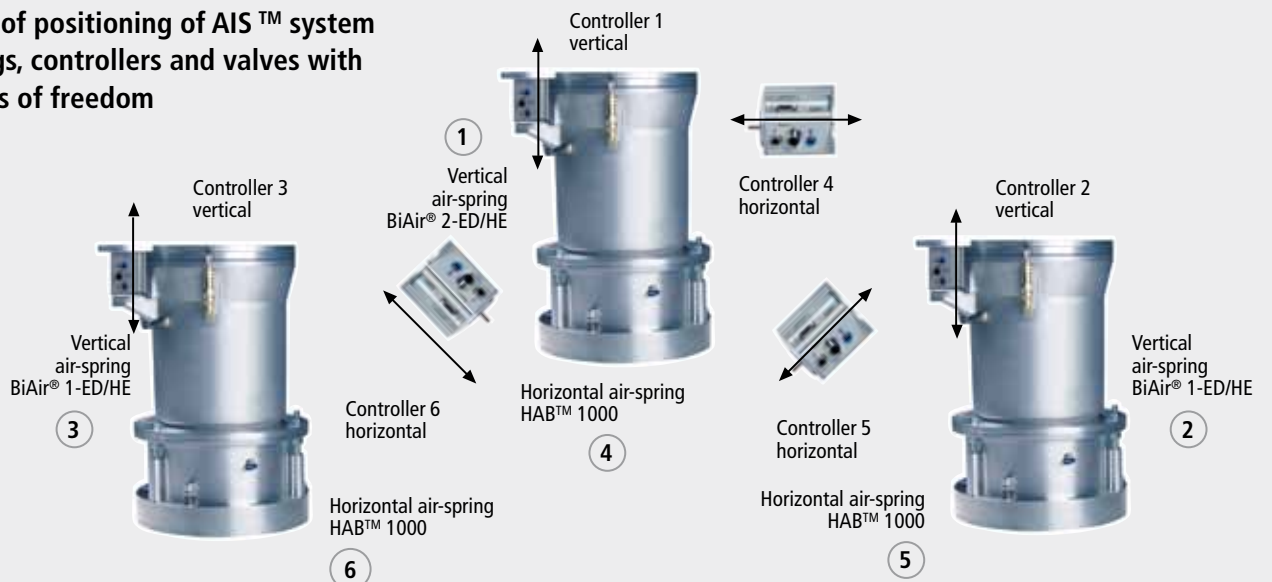
Transmissibility of AIS™ with 6 degrees of freedom



Vibrations criteria, VC



Example of positioning of AIS™ system air-springs, controllers and valves with 6 degrees of freedom



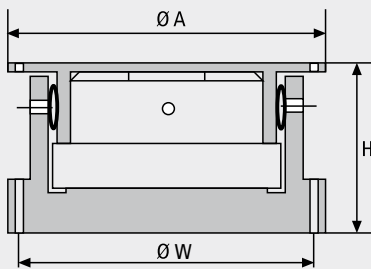


Patents: US 7,114,710 B2 - German Patent No. 102 49 647.1 - German Patent No. 102 49 647

● HAB™ Horizontal Air Spring

Type	Ø A (mm)	Ø W (mm)	H (mm)	leveling screw	Max. vertical load at 5,5 bar (N)	Max. horizontal load at 1 bar (N)	Adjustable horizontal natural frequency (Hz)
HAB™ 280	200	180	101	M 10 x 1,5	3400	150	1,1–1,9
HAB™ 660	250	230	118	M 10 x 1,5	7200	380	1,1–1,9
HAB™ 1000	300	276	159	M 12 x 1,5	11000	490	1,1–1,9
HAB™ 1000-HL	300	276	159	M 12 x 1,5	14000	490	1,1–1,9
HAB™ 24 000	350	326	172	M 16 x 1,5	23500	700	1,1–1,9
HAB™ 38 000	422	398	187	M 16 x 1,5	38000	1100	1,1–1,9

Bigger sizes upon request !



Air-Bearing
Leveling screw



Air-tube
Transportation and centering screw

Advantages of new HAB™ in comparison to conventional air-springs:

- Adjustable horizontal natural frequency.
- Adjustable horizontal dampening.
- Very low natural frequency / very efficient vibration isolation.
- Friction free operation, no stick-slip or hysteresis.
- When used as part of the AIS™ System no amplification at resonance
- Very high dampening,
- Minimum settling time,
- Excellent level accuracy.

Design

The pneumatic horizontal vibration isolator HAB™ is constructed of a cylindrical top and bottom housing. Air tubes placed into the annular space between the two housings provide the horizontal force to counter any relative movement between the two housings.

The horizontal force or natural frequency of the HAB™ can be adjusted by changing the air pressure of these air tubes. A specially designed air bearing handles the vertical load and provides friction free smooth horizontal movement between the top and bottom housings.



A. Base platform



B. Platform for integration in raised-/ cleanroom floor



● Vibration isolated platforms

Our years of experience in the field of vibration isolation combined with our broad range of standard products guarantee the best technical and cost-effective solution.

1. Vibration Analysis

To optimize the design layout and achieve the best isolation results BILZ starts by conducting an on-site vibration analysis. BILZ uses high-end FFT-Analyzers along with the best seismic acceleration sensors and geophones on the market.

2. Engineering and Design

Complementing our broad range of products, BILZ offers customized systems and solutions that guarantee superior results. Engineering and design is part of our core business and our technical leadership is advanced through R&D and continuous improvement.

3. Production

Production, assembly and quality control is in-house and located within our headquarters in Stuttgart-Leonberg, Germany. Special requirements such as: Cleanroom packaging or special logistic solutions can also be offered. BILZ is ISO 9001 certified.

4. Installation

System installation can be conducted by BILZ field service engineers or by trained customer staff. The BILZ Active Electro-Pneumatic Isolation System can be installed and put into operation, including acceptance test, in one or two days. BILZ guarantees global service and support, with representatives in more than 20 countries.



C. Platform for minimum working height and low center of gravity



D. Platform for minimum working height and very low center of gravity

Field of application

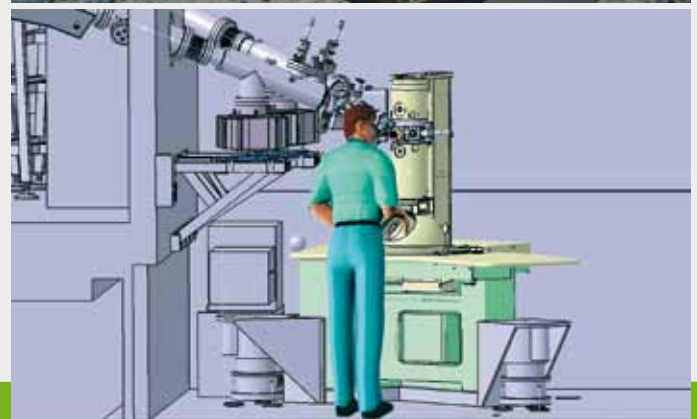
In many leading-edge industries the equipment and process requirements are becoming more demanding. Sub-micron, nano or even angstrom resolution is becoming a common customer requirement. Due to facility and on-site conditions, e.g. floor vibration, these resolutions are very hard to reach. High-end microscopes, metrology, inspection and repair equipment as well as other sensitive tools in the semiconductor industry, micro-biology and scientific research will not perform to specification without adequate vibration isolation. Isolated platforms are used when the equipment does not have an internal vibration isolation system or when the internal system is not effective enough in isolating the external vibration.

System design

Based on customer requirements of isolation performance and on-site conditions, BILZ can design and build customized systems using cost-effective passive isolators with mechanical level control or for high-end requirements the cutting-edge active AIS™ isolation system in 6 degrees of freedom. The platforms are customized and optimized in terms of rigidity, weight, dimensions, center-of-gravity, and choice of isolators according to customer requirements.

Results

Depending on the customer requirements, floor conditions and system design of the isolated platforms, BILZ will enable your machine to meet vibration criteria of VC-D ($<6\mu\text{m/s}$) and VC-E ($<3\mu\text{m/s}$). This allows our customers to reach specification from nano to sub-angstrom resolution.





Measurement-technological vibration analysis

Measurements of vibration and mechanical shocks.

We use the most modern measurement equipment (FFT-Analyser + PC calculation programs).

Our decades of experience in the field of vibration technology guarantees technically and economically reliable solutions for your problems.

Measurement-technological vibration analysis

Tasks

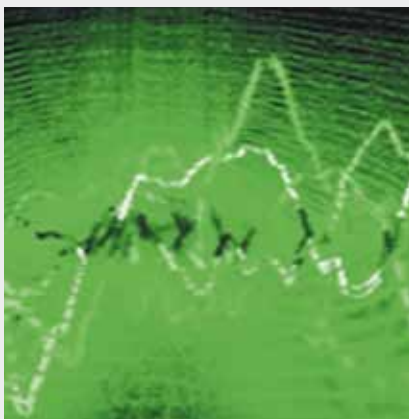
The measurement-technological coverage of oscillation emissions e.g. immissions as a basis for vibration technological measurement to observe legally laid down limit values (see graph 1).

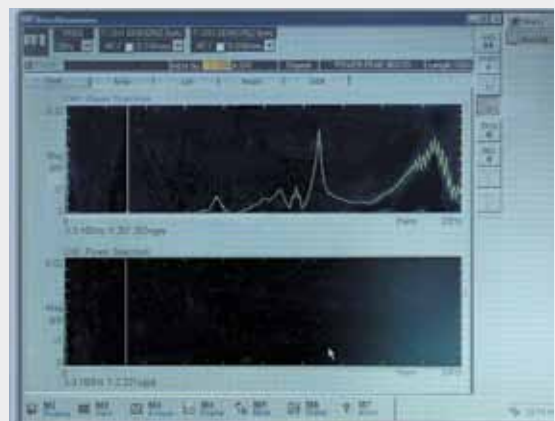
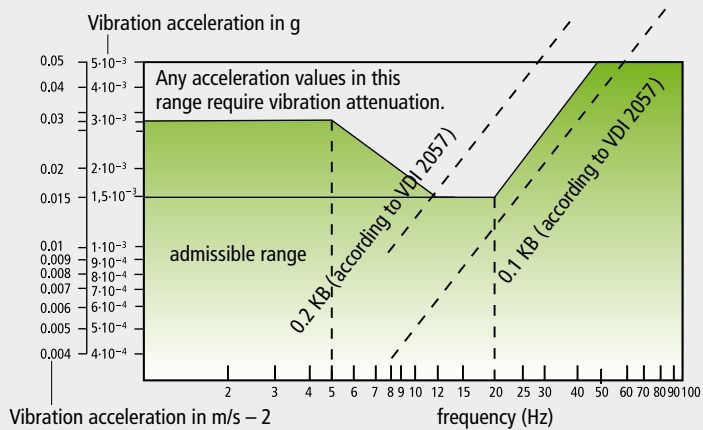
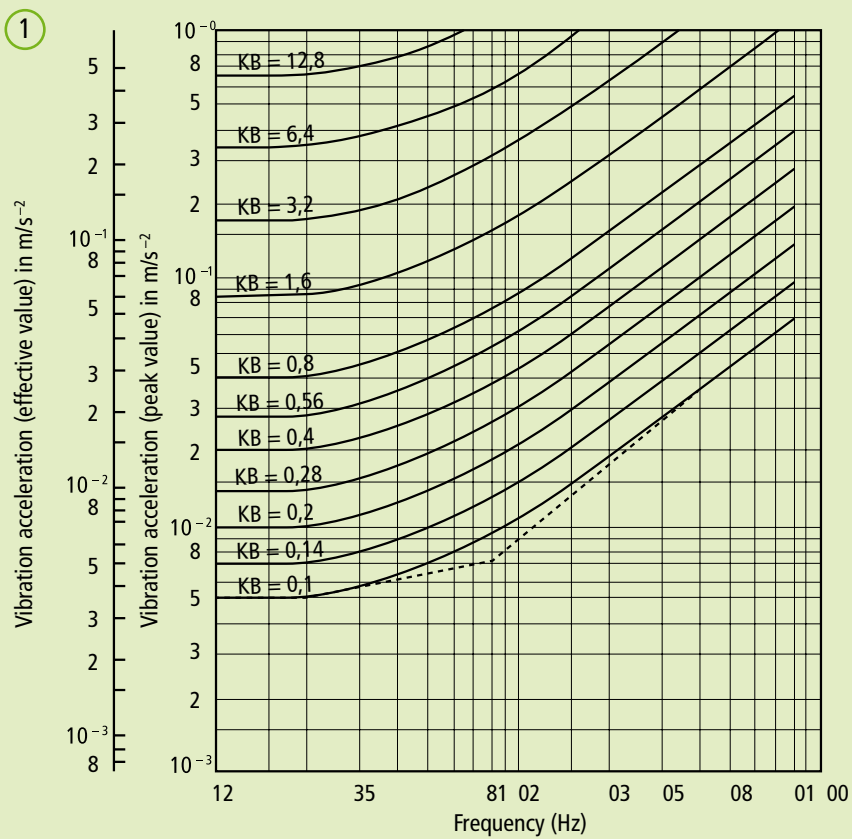
As can be seen from graph 2, different limit values must be observed, depending on the location of the machine. This standard aims at laying down principles according to which mechanical shocks can be measured in buildings, enabling the determination of effects of vibrations on human beings and building construction.

Another relevant example for the necessity of a vibration analysis is the mounting of high-precision coordinate measuring machines as well as of other testing, measuring or grinding machines. As a rule, measurement-tests must be carried out on proposed locations for such machines to ensure that local ground oscillations do not exceed permissible values.

To this end oscillation accelerations within a given frequency spectrum (1–100 Hz) are taken down, because a simple summation value measurement would give only an approximate indication of the exact environmental conditions. The evaluation of the power-path signals takes place with a Fast Fourier analyser, indicating the measured value for each frequency of the spectrum (vibration acceleration in g). Should the interferences (vibration magnitude) be outside the admissible range, a suitable insulation can be worked out with the assistance of our computer calculation programs.

Very accurate and sensitive vibration analyses at low frequencies are carried out with a high-tec Geophone. With the Geophone it is possible to measure vibration amplitudes from $0.01 \mu\text{m/s}$ at frequencies from 0.2 to 30 Hz. Especially in the nano-tec and semiconductor industry as well as in the field of cutting edge 3D metrology absolute accurate vibration measurements is of great importance to achieve optimal and customer specific vibration isolation.





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