Bilz®

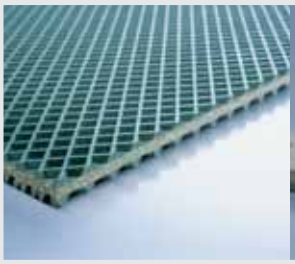
VIBRATION TECHNOLOGY

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.

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.
Our team is ready to solve your toughest vibration problems.



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.

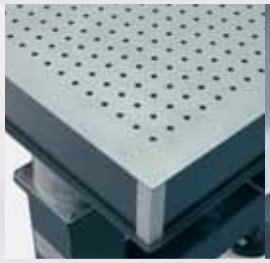
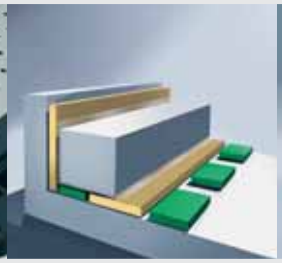
Technical qualification
Our engineers and technical specialists are continually participating in training, and are being kept aware of current developments keeping them up-to-date with the latest technical standards.

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.




For each problem
we provide the correct solution!

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 improvment 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).

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.

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!

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 $\sqrt{2}$.

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.

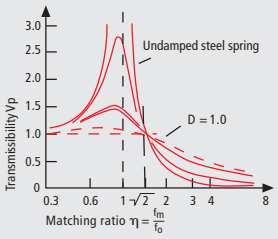
It follows that: Efficiency of vibration insulation

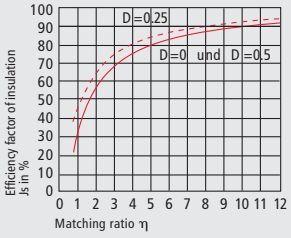
f_o = natural frequency of isolator
f_m = forcing frequency of the machine

$$J_S = \frac{\left(\frac{f_m}{f_o}\right)^2 - 2}{\left(\frac{f_m}{f_o}\right)^2 - 1} \cdot 100\ \%$$

Transmissibility by taken dampening factor D into consideration is:

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





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 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:

$$J_S = 100 \text{ x } \left(1 - \frac{1}{\eta s}\right) \%\ ; \quad \eta s = \frac{\eta b}{\eta e}$$

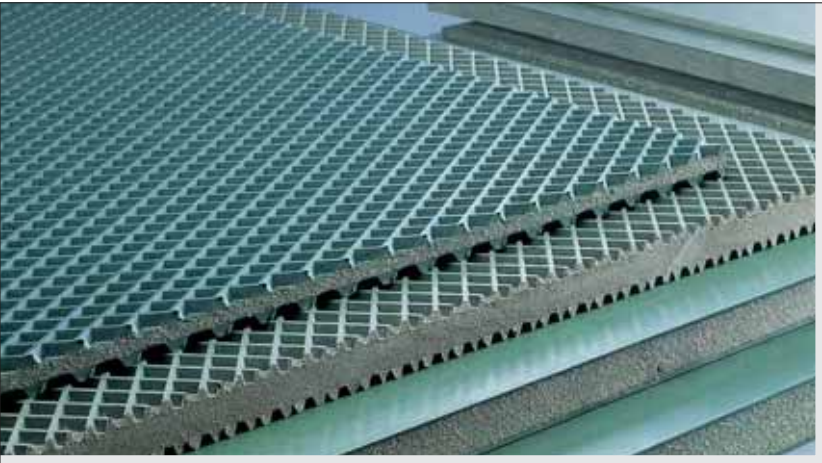
ηb = natural frequency of the system rigidly secured to the ground
ηe = natural frequency of the system when placed on insulators containing springs

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.

Contents



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!

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

Group: lubricants
Roller and friction bearing greases, gear lubricant grease

Group: synthetic lubricants
Polyalkylenglycols, ester of a carbonic acid, radiator antifreeze

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

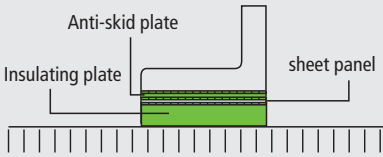
Group: fire resistant pressure liquids
Oil in water emulsions, water in oil emulsions, water polymeric solutions

Group: 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

Group: purifiers
Chlorinated hydrocarbons, petroleum ether/benzine, cold purifiers

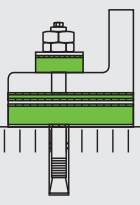
Group: purifiers (watery solutions)
Washing and Rinsing agents, wetting agents, dilute acids, dilute alkaline solutions, salt solutions

Application Technology 1



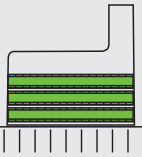
Machine mounting on BILZ insulating plates for machines that don't require a high degree of mounting precision. Floor unevenness can be compensated for by using shim plates, etc. The plates are normally geometrically positioned. Size is determined on the basis of machine weight and available contact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

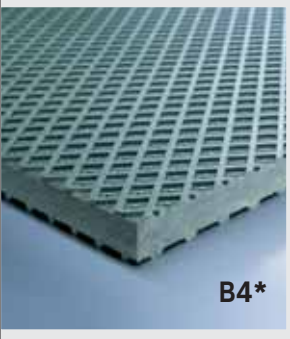


Highly effective impact and vibration insulation using BILZ insulator plate sets.
When insulating pulsating forces (presses, hammers, feed presses), BILZ plates are in this case combined to from sets. This helps to achieve extremely low natural vibration frequencies. Their great advantage over steel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

for vibration and structure-borne noise isolation

size of plates in mm	surface area in cm²	size of plates in mm	surface area in cm²	size of plates in mm	surface area in cm²	size of plates in mm	surface area in cm²
1000 x 500	5000	150 x 150	225	50 Ø	20	238 Ø	450
500 x 500	2500	150 x 100	150	75 Ø	44	300 Ø	710
500 x 250	1250	150 x 75	112	110 Ø	95		
250 x 250	625	100 x 100	100	130 Ø	133		
200 x 200	400	100 x 50	50	150 Ø	176		
200 x 100	200	75 x 75	56	200 Ø	314		
		50 x 50	25				

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.

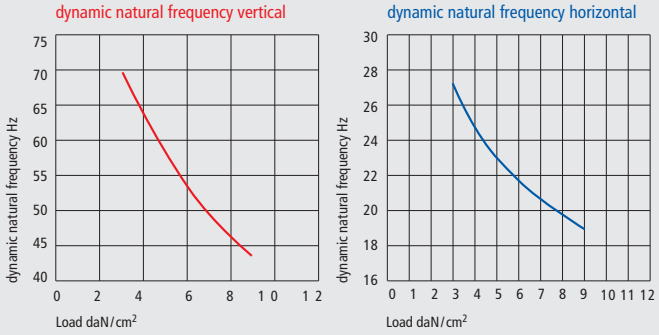


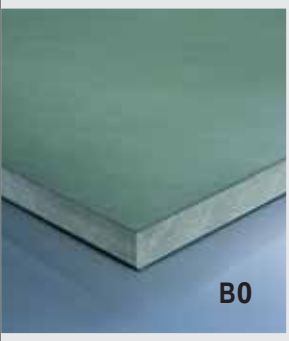
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B4*	3–10	15	0,8

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"



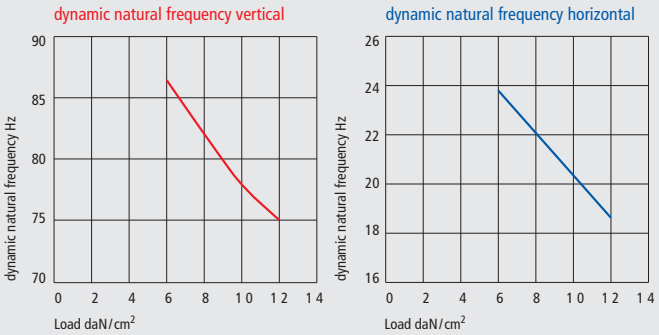


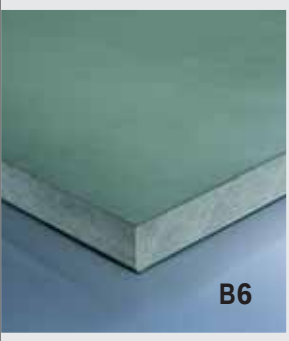
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B0	5–12	15	0,6

Range of application:

Without profile. Very high level consistency.

Particularly for machines with little rigidity such as: lathes, machining centers, transfer lines etc,

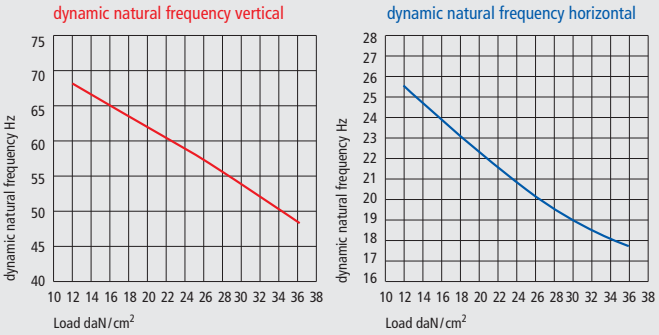




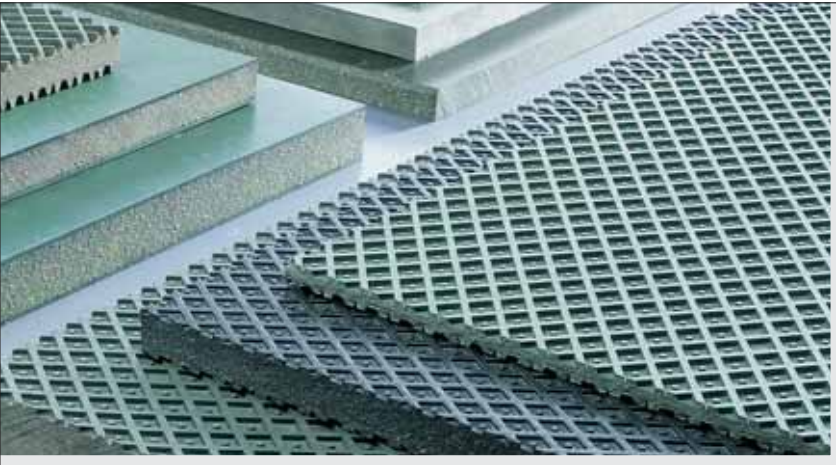
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B6	10–40	15	0,6

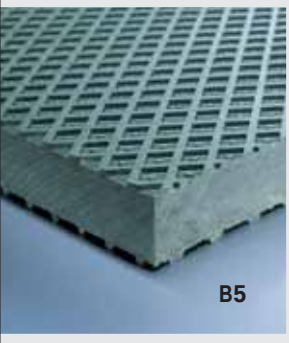
Range of application:

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



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



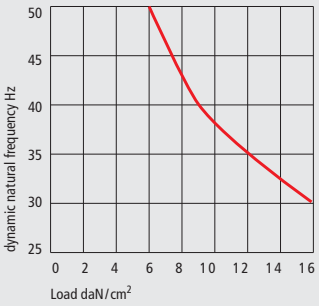


Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B5	5–16	25	0,8

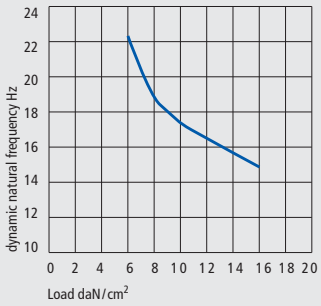
Range of application:

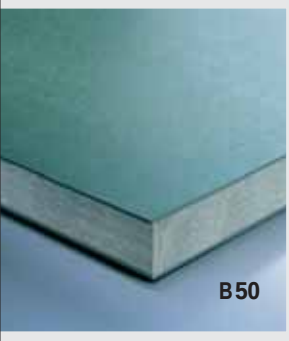
For machines with high dynamic disturbance properties and only a small support plate, e.g. presses, stamping presses, shears etc.

dynamic natural frequency vertical



dynamic natural frequency horizontal



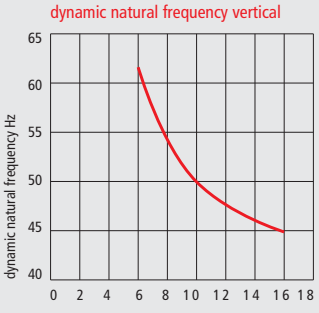


Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B50	5–16	25	0,8

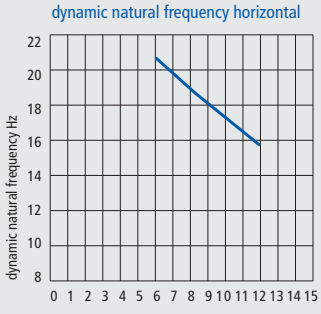
Range of application:

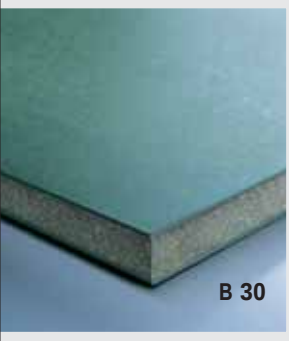
For machines with high dynamic disturbance properties and only a small support plate, e.g. presses, stamping presses, shears etc.

dynamic natural frequency vertical



dynamic natural frequency horizontal





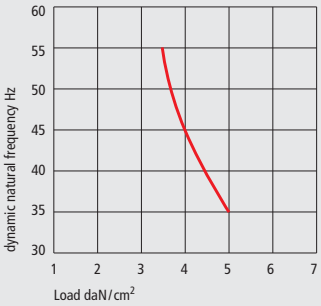
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B30	2–5	18	0,8

Range of application:

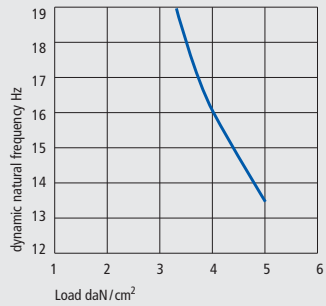
Soft kind without any profile.

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

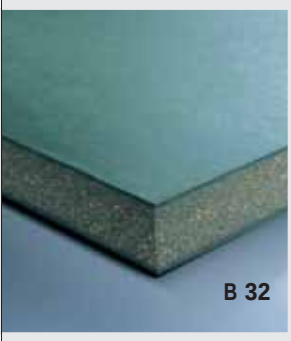
dynamic natural frequency vertical



dynamic natural frequency horizontal



for vibration and structure-borne noise isolation

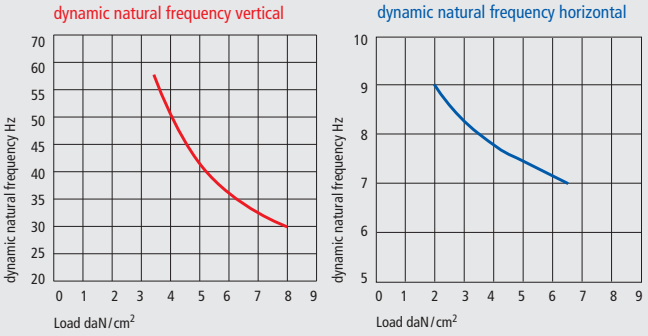


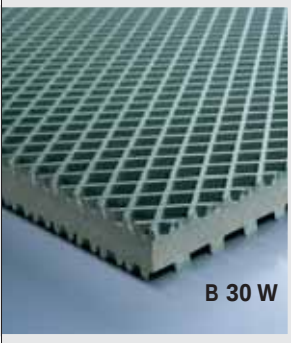
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B32	2–8	25	0,8

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!

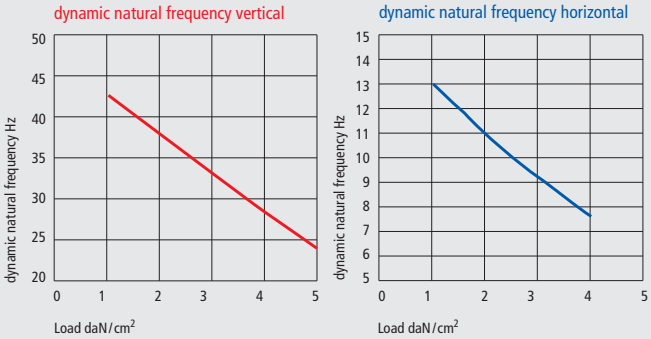


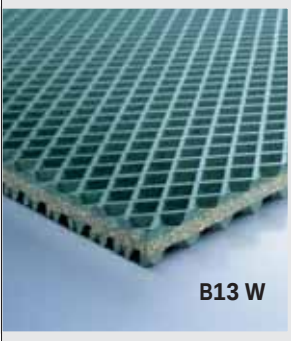


Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B30 W*	0,5–4	18	0,8

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.

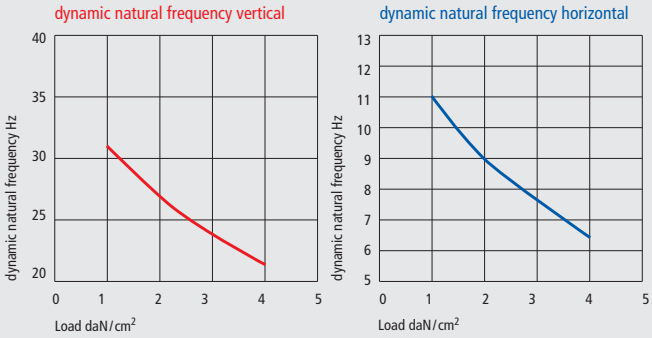




Type	Load daN/cm²	Thickness mm	Coefficient of friction η
B13 W	0,5–3,5	13	0,8

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.



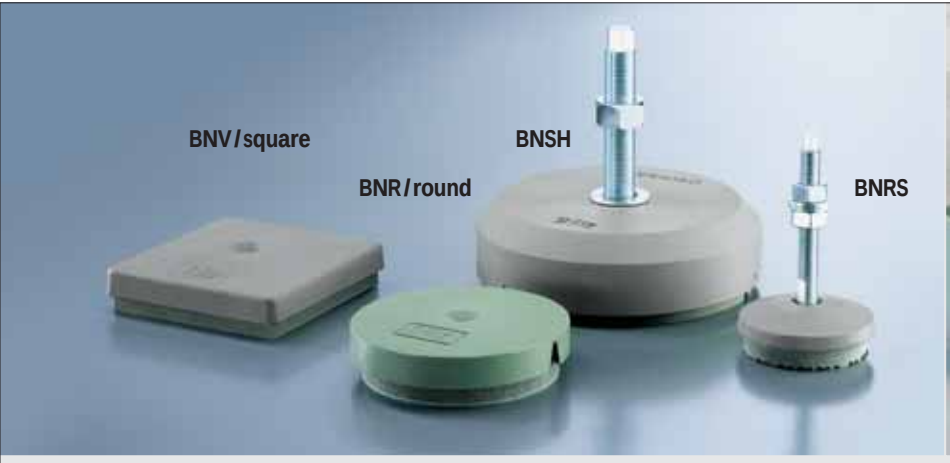
Type	Load daN/cm²	Thickness mm	Coefficient of friction η
BS	1–20	2	0,9
BN	1–20	5	0,6
BR-7*	2–10	7	0,8

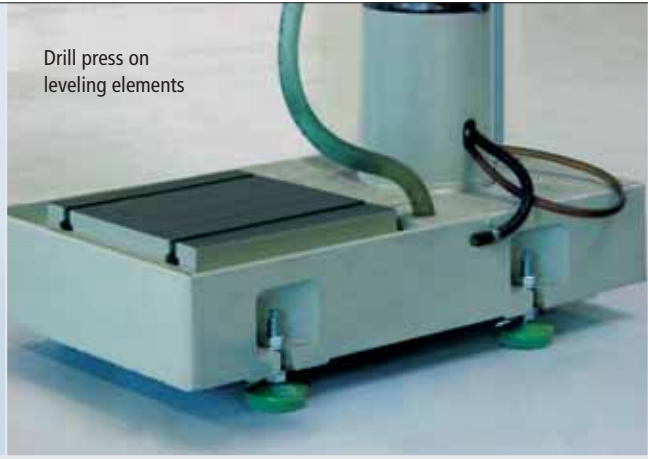
Range of application:

BILZ anti-skid and spacer plates.

No vibration insulation!

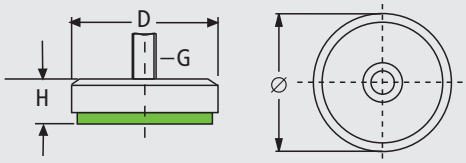
* Can be supplied also with profile on one side only! Designation e.g. B4 - 1.





Leveling elements series, type BNSH

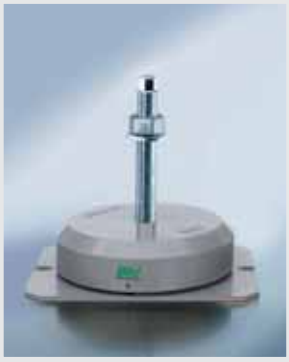
Range of application: BILZ leveling elements **BNS** are specially suited for the positioning of presses, automatic stamping machines automatic die-casting machines etc.
Examples: BNSH 120/50 means: equipped with type **50.**
Application: Medium efficiency of isolation.
BNSH 120/32 means: equipped with type **B32**.
Application: For highly effective insulations. In particular used on upper floors.

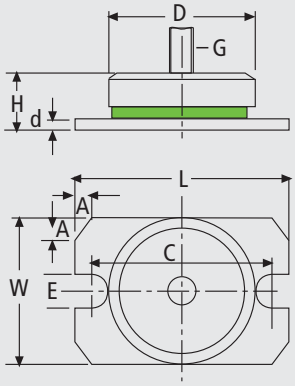


type	max. load daN/pc.	type	max. load daN/pc.	height H mm	D = mm	range of adjustment mm	G
BNSH 70/50	450	BNSH 70/32	250	34	80	8	M 10 x 1,25 x 100/125
BNSH 80/50	800	BNSH 80/32	500	45	96	12	M 12 x 1,5 x 80/125/150
BNSH 120/50	1.600	BNSH 120/32	1.000	54	133	20	M 16 x 1,5 x 100/150/200
BNSH 160/50	3.500	BNSH 160/32	2.200	60	175	20	M 20 x 1,5 x 100/125/150/200
BNSH 175/50	4.300	BNSH 175/32	2.700	65	200	20	M 20 x 1,5 x 100/125/150/200
BNSH 200/50	6.500	BNSH 200/32	3.600	69	227	20	M 24 x 2,0 x 200/150
BNSH 250/50	9.000	BNSH 250/32	4.800	69	270	20	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.





	L	W	D	C	d	E	A	H	G
BNSHA 80	140	90	96	120	5	13	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 200/150
BNSHA 250	330	265	250	300	8	20	20	77	M 30 x 2,0 x 150/200

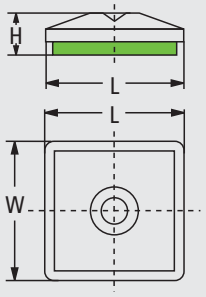
Range of adjustment and load capacity same as BNSH.

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 tpye **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).

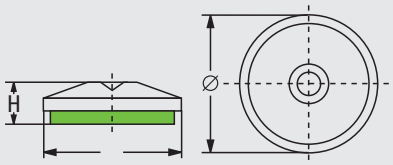


BNV (square)

type	load daN/pc.	type	load daN/pc.	type	load daN/pc.	L mm	W mm	H Sorte 4 mm	H Sorte 0 mm	H Sorte 30 W
BNV 50/4	150	BNV 50/0	200	BNV 50/30 W	65	60	60	22	22	25
BNV 80/4	450	BNV 80/0	550	BNV 80/30 W	160	85	85	24	24	27
BNV 110/4	1000	BNV 110/0	1200	BNV 110/30 W	400	123	123	27	27	30
BNV 115/4	1000	BNV 115/0	1200	BNV 115/30 W	400	163	88	29	29	32
BNV 150/4	1800	BNV 150/0	2250	BNV 150/30 W	700	147	147	32	32	35
BNV 200/4	3000	BNV 200/0	4000	BNV 200/30 W	1400	265	165	35	35	38

BNR (round)

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



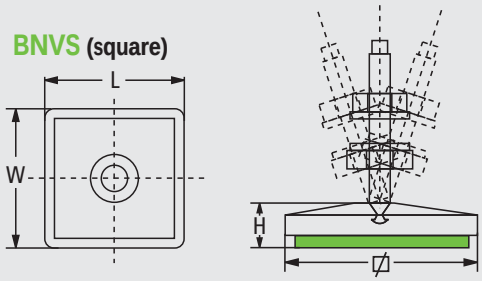
type	load daN/pc.	type	load daN/pc.	type	load daN/pc.	Ø mm	H type 4 mm	H type 0 mm	H type 30 W
BNR 50/4	150	BNR 50/0	150	BNR 50/30 W	55	60	21	21	24
BNR 80/4	400	BNR 80/0	500	BNR 80/30 W	140	85	21	21	24
BNR 110/4	800	BNR 110/0	1000	BNR 110/30 W	300	121	26	26	29
BNR 150/4	1500	BNR 150/0	1800	BNR 150/30 W	450	162	30	30	33
BNR 200/4	2500	BNR 200/0	3500	BNR 200/30 W	1000	213	30	30	33

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

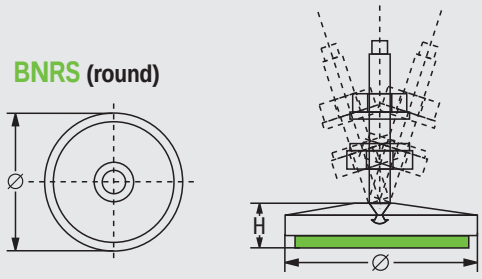
Range of application:
Types **BNVS + BNRS** are used in cases where a firm connection of the element to the machine is desireable! Angle differences are equalized by means of the movable leveling screw.

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)



BNVS (square)

type	load daN/pc.	type	load daN/pc.	type	load daN/pc.	W mm	H type 4 mm	H type 0 mm	H type 30 W
BNVS 50/4	150	BNVS 50/0	200	BNVS 50/30 W	65	60	22	22	25
BNVS 80/4	450	BNVS 80/0	550	BNVS 80/30 W	160	85	24	24	27
BNVS 110/4	1000	BNVS 110/0	1200	BNVS 110/30 W	400	123	27	27	30
BNVS 150/4	1800	BNVS 150/0	2250	BNVS 150/30 W	700	147	32	32	35

BNRS (round)

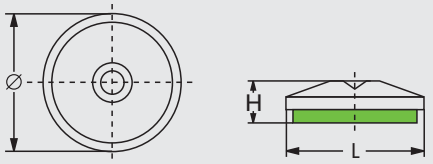
type	load daN/pc.	type	load daN/pc.	type	load daN/pc.	Ø mm	H type 4 mm	H type 0 mm	H type 30 W
BNRS 50/4	100	BNRS 50/0	150	BNRS 50/30 W	55	60	21	21	24
BNRS 70/4	400	BNRS 70/0	450	BNRS 70/30 W	140	78	28	28	31
BNRS 110/4	800	BNRS 110/0	1000	BNRS 110/30 W	300	121	28	28	31
BNRS 150/4	1500	BNRS 150/0	1800	BNRS 150/30 W	450	162	30	30	33

for vibration and structure-borne noise isolation

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 pharmaceutic industries.
Screws and nuts can be supplied on request.

Type series BNRV without leveling screw

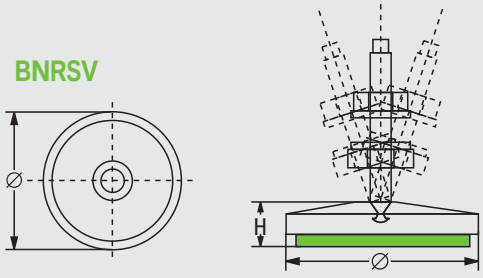


type	load daN/pc.	type	load daN/pck.	type	load daN/pc.	Ø mm	H = tpye 4 mm	H = type 30-W mm	H = type BR 7 mm
BNRV 50/4	150	BNRV 50/30-W	50	BNRV 50/BR 7	200	54	25	28	17
BNRV 70/4	400	BNRV 70/30-W	150	BNRV 70/BR 7	600	76	28	31	20
BNRV 110/4	800	BNRV 110/30-W	400	BNRV 110/BR 7	1200	116	29	32	21
BNRV 150/4	1500	BNRV 150/30-W	800	BNRV 150/BR 7	2500	156	31	34	23

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



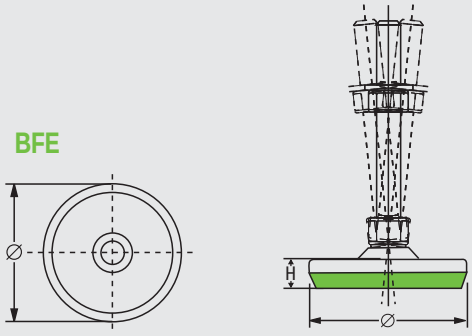
BNRV 110/BR 7 e.g. BNRSV 110/BR 7 = BR 7 stands for: equipped with anti-slip panel. No vibration insulation!

type	load daN/pc.	type	load daN/pc.	type	load daN/pc.	leveling screw incl. 2 nuts + 2 washers (VA) mm
BNRSV 50/4	100	BNRSV 50/30-W	50	BNRSV 50/BR 7	200	M 10 x 70/100/200
BNRSV 70/4	400	BNRSV 70/30-W	150	BNRSV 70/BR 7	600	M 12 x 100/150/200
BNRSV 110/4	800	BNRSV 110/30-W	400	BNRSV 110/BR 7	1200	M 16 x 100/150/200
BNRSV 150/4	1500	BNRSV 150/30-W	800	BNRSV 150/BR 7	2500	M 20 x 100/150/200

Type BFE with leveling screw
(flexibly connected)
in stainless steel

Field of application:
Low cost **stainless stell elements** for the food, pharmaceutic, the packing and the chemistry industry.

BFE



type	Ø mm	H 1 mm	load daN/pc.	leveling screw incl. 2 nuts + 2 washers (VA) mm
BFE 50	50	14	300	M 8/ 10 x 50/80/100/120/150/180/200
BFE 80	80	17	850	M 12 x 50/80/100/120/150/180/200
BFE 100	100	19	2000	M 16 x 50/80/100/120/150/180/200/250/300
BFE 120	125	19	3000	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)

Leveling screws (galvanized)

incl. 2 nuts + 2 washers (VA)

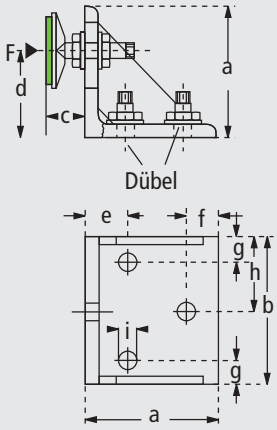
The size of the screws depends upon the size of the hole in the machine foot!

Ø	Length in mm
M 10	70
	100
M 12	70
	100
	125
	150
M 16	100
	125
	150
	200
	250
M 18	100
	125
	150
	200
	250
	300
M 20	100
	125
	150
	200
	250
	300
M 24	150
	200
	250
	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

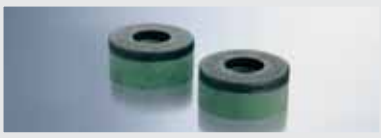
Size 2, consisting of: steel angle, leveling element type BNV 115/5, 3 screws M 20x150, 3 patented plugs M 20



Dimensions mm		a	b	c	d min.	d max.	e	f	g	h	∠	i	F in daN
	Size 1	140	125	45	60	115	50	25	35				1500
	Size 2	160	180	55	60	140	50	40	35		90	22	2500

Insulating disks for screws head insulation

(bolt-through version)



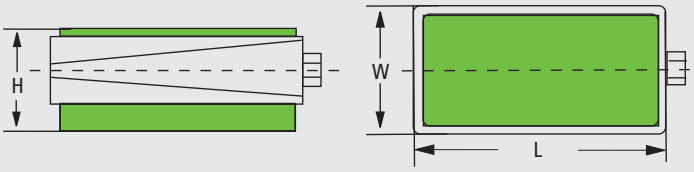
Isolation of structure-borne noise for deep-seated machines and pipe suspensions.

for screws Ø	outside Ø mm	hole Ø mm	mounting height mm	max. prestress force daN
up to M 12	35	13	20	200
up to M 20	50	21	21	300
up to M 30	70	31	25	450

Anchor recommendation:

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

Krauss Maffei injection molding machine on precison wedge mounts



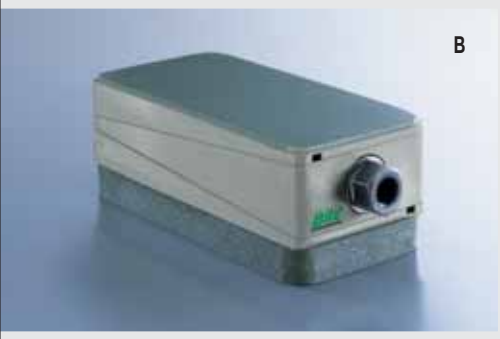
A

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 daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-A	450	105	55	59	8
PK 2-A	900	150	75	63	10
PK 3-A	1800	200	95	67	10
PK 3/72-A	1800	200	95	94	10
PK 4-A	4000	200	200	70	12
PK 4/72-A	4000	200	200	94	12
PK 5-A	5000	200	250	94	18
PK 6-A	8200	250	330	94	18
PK 7-A	12000	300	400	94	20
PK 8-A	20000	400	500	97	20
PK 9-A	30000	500	600	172	22



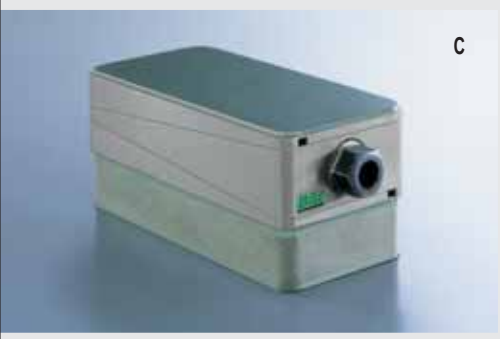
B

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 daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-B	600	105	55	54	8
PK 2-B	1300	150	75	58	10
PK 3-B	2200	200	95	63	10
PK 3/72-B	2200	200	95	89	10
PK 4-B	4800	200	200	66	12
PK 4/72-B	4800	200	200	89	12
PK 5-B	6000	200	250	89	18
PK 6-B	10000	250	330	89	18
PK 7-B	15000	300	400	89	20
PK 8-B	24000	400	500	92	20
PK 9-B	36000	500	600	167	22



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 daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-C	400	105	55	64	8
PK 2-C	800	150	75	68	10
PK 3-C	1500	200	95	73	10
PK 3/72-C	1500	200	95	99	10
PK 4-C	3200	200	200	76	12
PK 4/72-C	3200	200	200	99	12
PK 5-C	4000	200	250	99	18
PK 6-C	6500	250	330	99	18
PK 7-C	10000	300	400	99	20
PK 8-C	16000	400	500	102	20
PK 9-C	25000	500	600	177	22

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.

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			

Notice: We are always pleased to fulfill special requests!

Precision Wedge Mounts, Series PK, free-standing

BILZ Precision Leveling Wedge PK are used where a firm mounting with the machine is not required. The high coefficient of friction of the isolation materials and anti-skid plates keep the machine in place.

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 daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-D	800	105	55	67	8
PK 2-D	1300	150	75	71	10
PK 3-D	2500	200	95	76	10
PK 3/72-D	2500	200	95	104	10
PK 4-D	5500	200	200	79	12
PK 4/72-D	5500	200	200	104	12
PK 5-D	7000	200	250	104	18
PK 6-D	10000	250	330	104	18
PK 7-D	16000	300	400	104	20
PK 8-D	30000	400	500	107	20
PK 9-D	45000	500	600	182	22

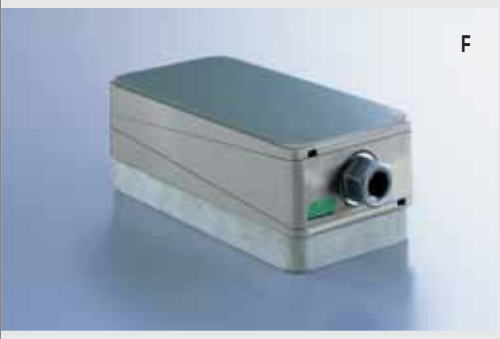
range of application
Component Set E

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 daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-E	1400	105	55	41	8
PK 2-E	3500	150	75	45	10
PK 3-E	5700	200	95	49	10
PK 3/72-E	5700	200	95	76	10
PK 4-E	12000	200	200	52	12
PK 4/72-E	12000	200	200	76	12
PK 5-E	20000	200	250	76	18
PK 6-E	25000	250	330	76	18
PK 7-E	35000	300	400	76	20
PK 8-E	60000	400	500	79	20
PK 9-E	90000	500	600	154	22



range of application
Component Set F

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

For extremly high loadability.

Very high level constancy.

type	load daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	range of adjustment mm
PK 1-F	2000	105	55	54	8
PK 2-F	4000	150	75	58	10
PK 3-F	6500	200	95	63	10
PK 3/72-F	6500	200	95	89	10
PK 4-F	14000	200	200	66	12
PK 4/72-F	14000	200	200	89	12
PK 5-F	21000	200	250	89	18
PK 6-F	28000	250	330	89	18
PK 7-F	45000	300	400	89	20
PK 8-F	70000	400	500	92	20
PK 9-F	110000	500	600	167	22

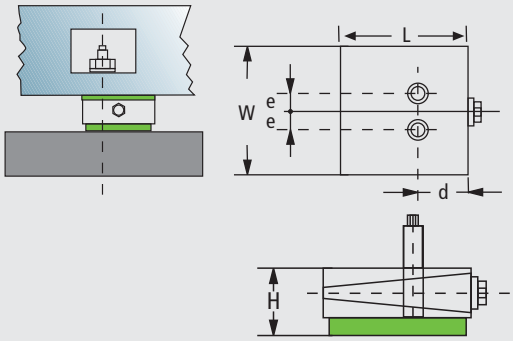
Gildemeister NEF 330
on precision leveling wedge mounts

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**



PKA 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 daN/pc.	length L mm	width W mm	height H in intermediate position mm	d mm	e mm	inside thread	range of adjustment mm
PKA 1-0	1300	115	115	60	50	24	M 16	8
PKA 2-0	2200	150	150	63	60	23	M 18	10
PKA 3-0	4800	200	200	63	75	27	M 20	12
PKA 3/72-0	4800	200	200	87	75	27	M 20	12
PKA 4-0	6000	200	250	88	95	27	M 20	18
PKA 5-0	10000	250	330	88	125	105	M 24	18
PKA 6-0	15000	300	400	90	150	100	M 24	20
PKA 7-0	24000	400	500	90	200	130	M 24	20
PKA 8-0	36000	500	600	165	255	150	M 30	22
PKA 1-4	1000	115	115	60	50	24	M 16	8
PKA 2-4	1800	150	150	63	60	23	M 18	10
PKA 3-4	4000	200	200	63	75	27	M 20	12
PKA 3/72-4	4000	200	200	87	75	27	M 20	12
PKA 4-4	5000	200	250	88	95	27	M 20	18
PKA 5-4	10000	250	330	88	125	105	M 24	18
PKA 6-4	15000	300	400	90	150	100	M 24	20
PKA 7-4	24000	400	500	90	200	130	M 24	20
PKA 8-4	36000	500	600	165	255	150	M 30	22

Screw-on base plate for PKA / PKAK precision leveling wedges

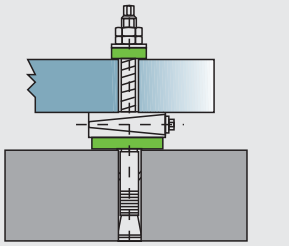
BILZ base plates provide a simple method for anchoring the machine to the ground. Base plates are attached to the precision leveling wedges with four countersunk-head screws. The base plates can be attached in three different mounting positions to fit different installation requirements.

More information on request!

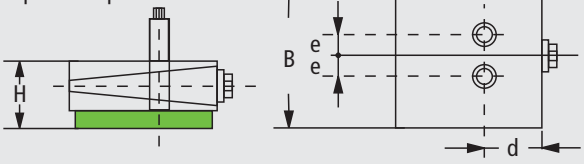
Precision Wedge Mounts, Series PKD
(bolt-through)

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 fulfil special requests!!



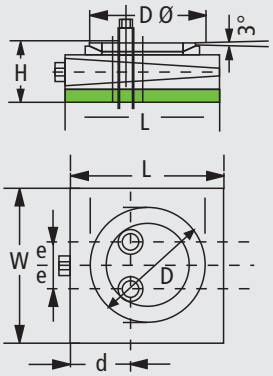
type	load daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	d mm	e mm	bore ø	range of adjustment mm
PKD 1-0	1300	115	115	60	50	24	22	8
PKD 2-0	2200	150	150	63	60	23	22	10
PKD 3-0	4800	200	200	63	80	27	26	12
PKD 3/72-0	4800	200	200	87	75	27	26	12
PKD 4-0	6000	200	250	88	95	27	26	18
PKD 5-0	10000	250	330	88	125	105	26	18
PKD 6-0	15000	300	400	90	150	100	30	20
PKD 7-0	24000	400	500	90	200	130	35	20
PKD 8-0	36000	500	600	165	255	150	35	22

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 bis PKDK 4-0
Range of application: drilling and milling machines, machining centers, special machines, long lathes, long planers

Bottom: **Insulating plate BO**



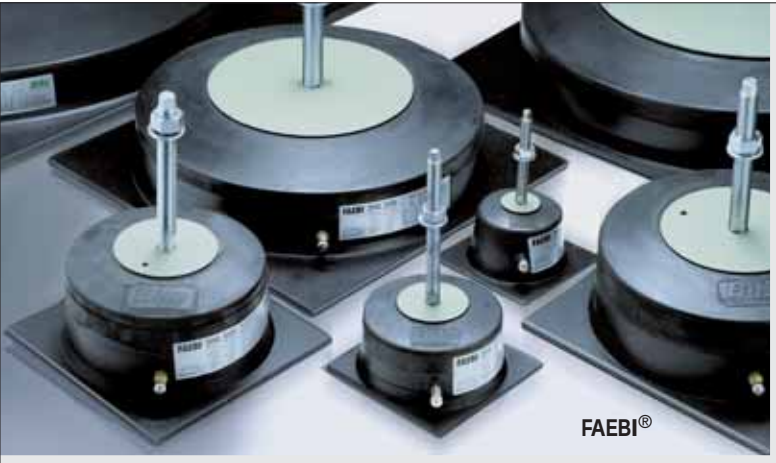
Notice:
We are always pleased to fulfill special requests!!

type	load daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	D mm	d mm	e mm	bore / threaded ø	range of adjustment mm
PKAK 1-0	1300	115	115	70	110	50	24	M 16	8
PKAK 2-0	2200	150	150	78	150	60	23	M 18	10
PKAK 3-0	4800	200	200	79	150	80	27	M 20	12
PKAK 4-0	6000	200	250	104	150	95	27	M 20	18
PKDK 1-0	1300	115	115	70	110	50	24	22	8
PKDK 2-0	2200	150	150	78	150	60	23	22	10
PKDK 3-0	4800	200	200	79	150	75	27	26	12
PKDK 4-0	6000	200	250	104	150	95	27	26	18

Precision wedge mounts PKAE
In stainless steel

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

type	load daN/pc.	length L mm	width W mm	height H in intermediate pos. mm	d mm	e mm	inside thread	range of adjustment mm
PKAE 1-0	1300	115	115	60	50	24	M 16	8
PKAE 2-0	2200	150	150	63	60	23	M 18	10



FAEBI®

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.

BILZ Level Controller Systems

Level control is important part of an optimally functioning air-spring system. Level control can be utilized whenever load changes occur on rubber air-spring insulated machines, causing an unwanted one-sided spring deflection of the air elements, e.g. tilting of the machine.

Insulation against Impact and Oscillation

Depending upon the static load, the natural frequency of the elements varies between to 2,5 – 6 Hz in vertical direction. The ratio between vertical and horizontal natural frequency is 1– 1,2. 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)

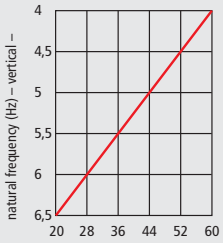
Assembly

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.

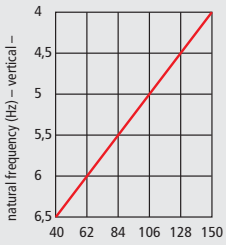
Control of Air Pressure

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

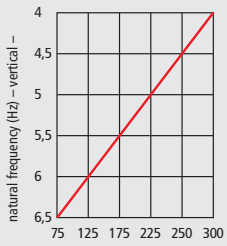
FAEBI® 50
Load (daN)



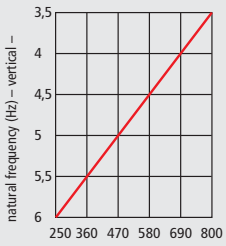
FAEBI® 75
Load (daN)



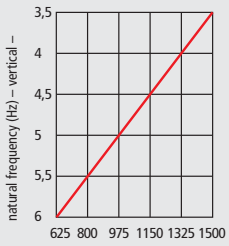
FAEBI® 100
Load (daN)



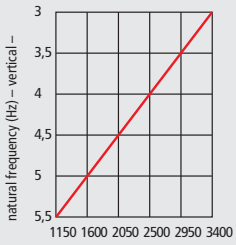
FAEBI® 150
Load (daN)



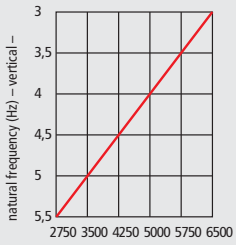
FAEBI® 200
Load (daN)



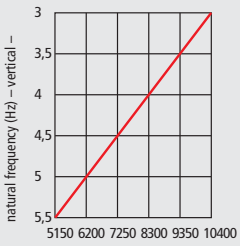
FAEBI® 300
Load (daN)



FAEBI® 430
Load (daN)



FAEBI® 580
Load (daN)



Combined Rubber-Airspring Insulator FAEBI®

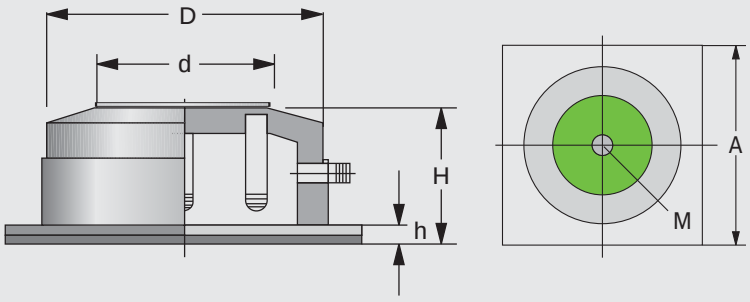
for shock and vibration insulation of machines, equipment and sub-assemblies

FAEBI® mechanical-pneumatic control valves

The mechanical-pneumatic relief valves are a simple yet effective solution. The level is constantly scanned by a plunger. The plunger position in 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 ± 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.

Müller-Weingarten punching machine on FAEBI® with level control



type	load daN/pc.	max. pressure / bar	A mm	D mm	H approx. mm = workheight	d mm	h mm	M
FAEBI® 50	20 - 60	3	110	80	60	35	5	M 10
FAEBI® 75	40 - 150	3	115	97	65	43	5	M 12
FAEBI® 100	75 - 300	5	135	118	72	60	5	M 12
FAEBI® 150	250 - 800	6	200	170	90	80	8	M 16
FAEBI® 200	625 - 1500	6	260	236	90	130	8	M 16
FAEBI® 300	1150 - 3400	6	370	340	90	200	8	M 20
FAEBI® 430	2750 - 6500	6	500	480	90	315	8	M 20
FAEBI® 580	5150 - 10400	6	680	650	99	380	14	M 24

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!

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

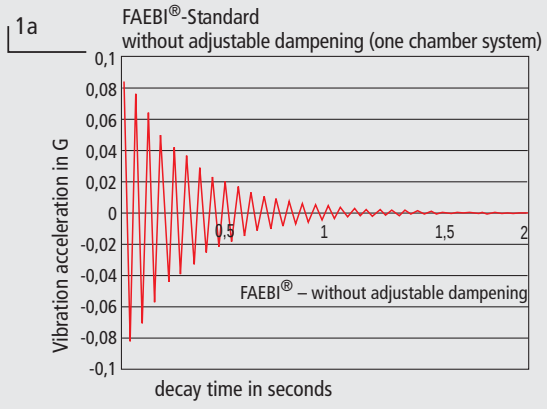
Combined Rubber-Airspring-Insulator
FAEBI®-HD with adjustable dampening

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.

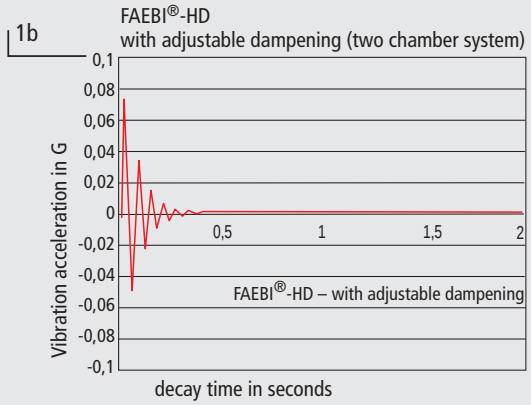
Because of the very high dampening, the resonance amplitude is much smaller and therefore you are able to achieve less machine movement. (see graph 1a + 1b) Furthermore the increased transformable energy takes effect on the production quality of your machinery.

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.

1a

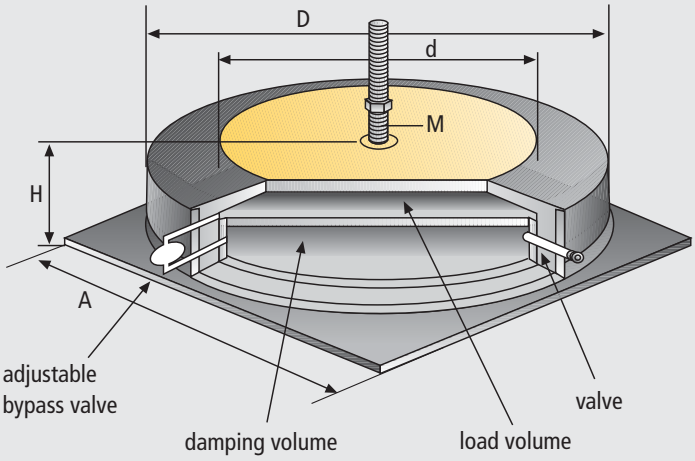


1b



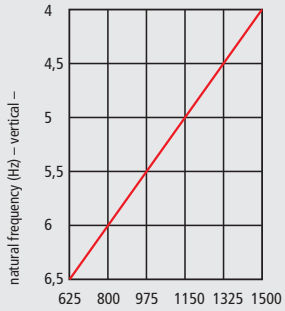
for shock and vibration insulation of machines, equipment and sub-assemblies

TRUMPF 5000 R mounted on FAEBI®-HD

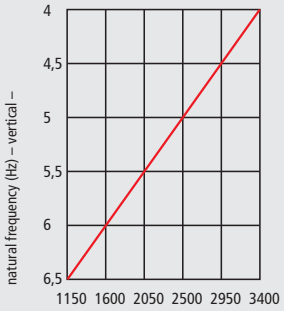


type	load daN/pc.	max. pressure / bar	A mm	D mm	H approx. mm = workheight	d mm	M
FAEBI® HD 200	625 - 1500	6	260	236	90	130	M 16
FAEBI® HD 300	1150 - 3400	6	370	340	90	200	M 20
FAEBI® HD 430	2750 - 6500	6	500	480	90	315	M 20
FAEBI® HD 580	5150 - 10400	6	680	650	136	380	M 24

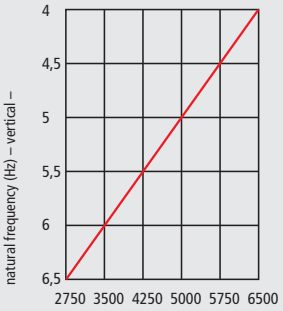
FAEBI® 200 HD
Load (daN)



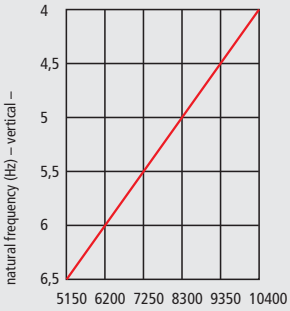
FAEBI® 300 HD
Load (daN)



FAEBI® 430 HD
Load (daN)



FAEBI® 580 HD
Load (daN)



BiAir®

Zeiss measuring center
mounted on BiAir®

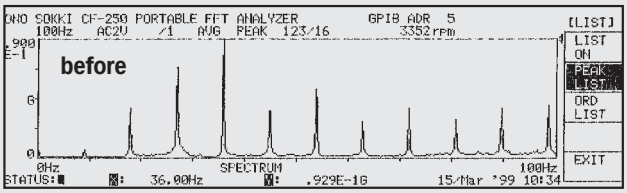
BiAir®

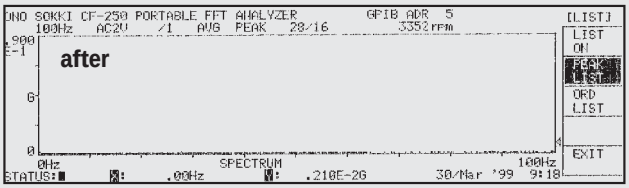
Product Description

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 consistancy will always be preserved! Automatic leveling/adjustment!

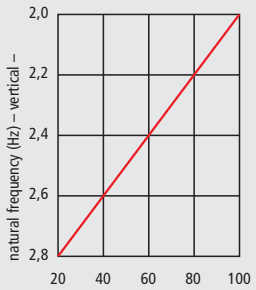
BILZ level controller systems

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.

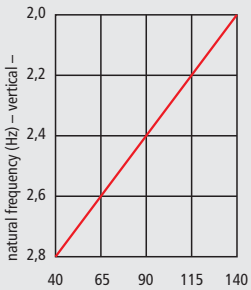
Control circuit

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.

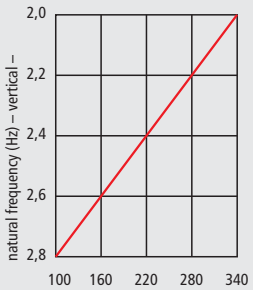
BiAir® 0,15-ED —
Load (daN)



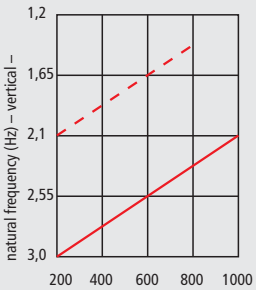
BiAir® 0,25-ED —
Load (daN)



BiAir® 0,5-ED —
Load (daN)

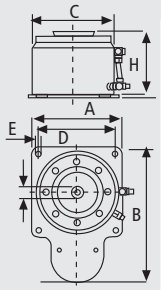


BiAir® 1-ED —
1-ED/HE ---
Load (daN)

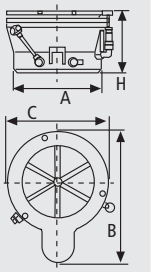


Membrane Air-Spring Insulator BiAir®

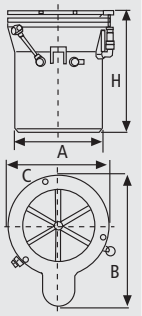
**with deep natural frequency and adjustable dampening (pat.)
for vibration insulation of measuring and testing machines,
optical and electronic equipment, laser machines,
fine machining plant, vehicle and motor performance testers etc.**



type	Ø A mm	width W mm	Ø C mm	workheight H mm	max. load daN at max. 4 bar	max. load daN at max. 6 bar	natural frequency Hz (vertical) approx.	natural frequency Hz (horizontale) approx.
BiAir 0,15-ED*	76	72	72	77	67	100	2,5	2,5
BiAir 0,25-ED*	110	182	110	87	113	170	2,5	2,5
BiAir 0,5 -ED*	130	190	129	100	267	400	2,5	2,5
BiAir 1 -ED*	200	275	200	100	633	950	2,5	2,5
BiAir 2 -ED*	260	350	260	100	1420	2130	2.5	2,5
BiAir 2,5 -ED*	300	390	300	100	1967	2950	2.5	2,5



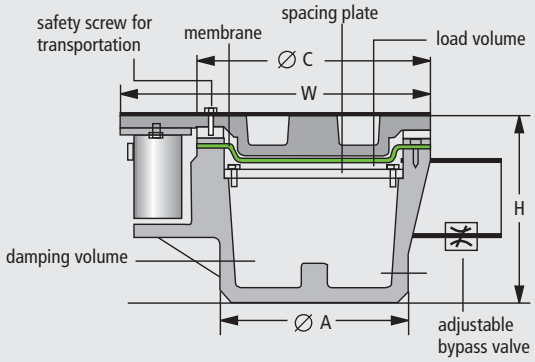
BiAir 0,5-ED**	120	216	129	157	267	400	2,5	2,5
BiAir 1 -ED**	172	288	200	157	633	950	2,5	2,5
BiAir 2 -ED**	226	335	260	157	1420	2130	2,5	2,5
BiAir 2,5-ED**	271	378	300	157	1967	2950	2,5	2,5
BiAir 3 -ED**	348	467	382	157	3413	5120	2,5	2,5
BiAir 4 -ED**	490	605	530	157	6573	9860	2,5	2.5
BiAir 5 -ED**	747	855	798	157	15573	23360	2,5	2,5



BiAir 1- ED/HE**	172	288	200	307	633	950	1,5	2,5
BiAir 2- ED/HE**	226	335	260	307	1420	2130	1,5	2,5
BiAir 2,5-ED/HE**	271	378	300	307	1967	2950	1,5	2,5
BiAir 3 -ED/HE**	348	467	382	307	3413	5120	1,5	2,5
BiAir 4 -ED/HE**	490	605	530	307	6573	9860	1,5	2,5

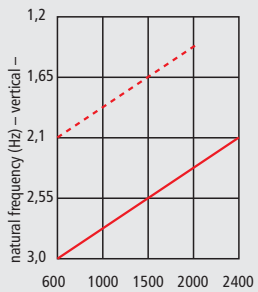
*Steel **Aluminium

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

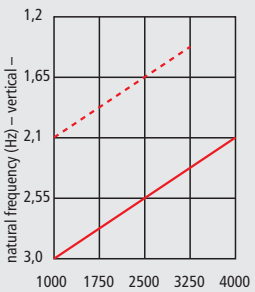


Air springs with higher max. loads as well as air springs with lower natural frequencies can be supplied upon request!

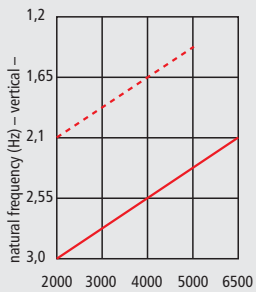
BiAir®
2-ED ——
2-ED/HE - - -
Load (daN)



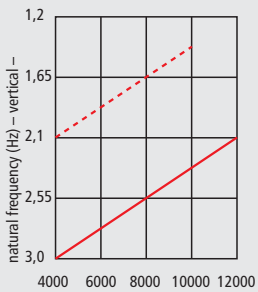
BiAir®
2,5-ED ——
2,5-ED/HE - - -
Load (daN)



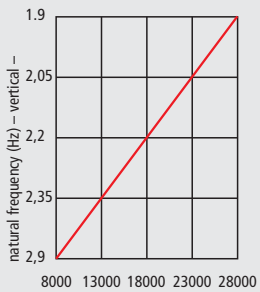
BiAir®
3-ED ——
3-ED/HE - - -
Load (daN)



BiAir®
4-ED ——
4-ED/HE - - -
Load (daN)



BiAir®
5-ED ——
Load (daN)



BiAir® MPN

BiAir® mechanical-pneumatic positioner / controller

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 accur-acy ± 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.

BiAir® EPN

BiAir® electro-pneumatic positioner/controller

Advantages
Important advantages of the BILZ level control are:

- a high reset accuracy e.g. level accuracy of ± 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 curcuit)
- wear-resistant and sturdy relief valves
- simple and effective set-up operation

System components
Each system consists of 3 position sensors, 3 electro-pneumatical 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-pneumatical 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.

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.

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 Hz) between frame and plate, mechanical-pneumatic level control (level accuracy of ± 1/100 mm or ± 1/10 mm).
Plate in granite (LTH)

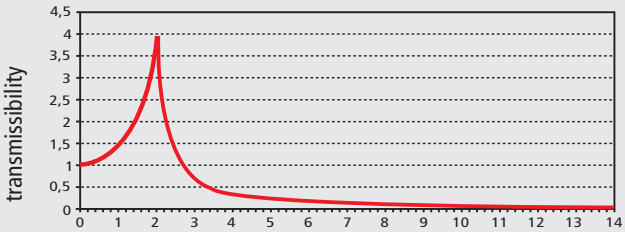
Range of Application

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 ± 1/100 mm or ± 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).

Function of transmissibility – insulated Table



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 hard stone	100 mm	100 mm	100 mm	140 mm	160 mm	190 mm	220 mm
	height	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm
	max. loading capacity	250 kg	320 kg	320 kg	700 kg	750 kg	1800 kg	2800 kg

LTO-Optical laboratory 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 plus/minus 1/100 mm or plus/minus 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 3mm/ magnetic or magnetic/ bloomed
Base plate: steel plate 3mm
Thread insert: M6 (HDT)
Core: (HD/T) steel honeycomb core with a 0.5mm 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 addiction about plus/minus 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 hard stone	100 mm	100 mm	100 mm	100 mm	200 mm	200 mm	300 mm
height	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm	760 mm
max. loading capacity	150 kg	200 kg	300 kg	500 kg	500 kg	750 kg	750 kg

LTH-S Tables / Special models

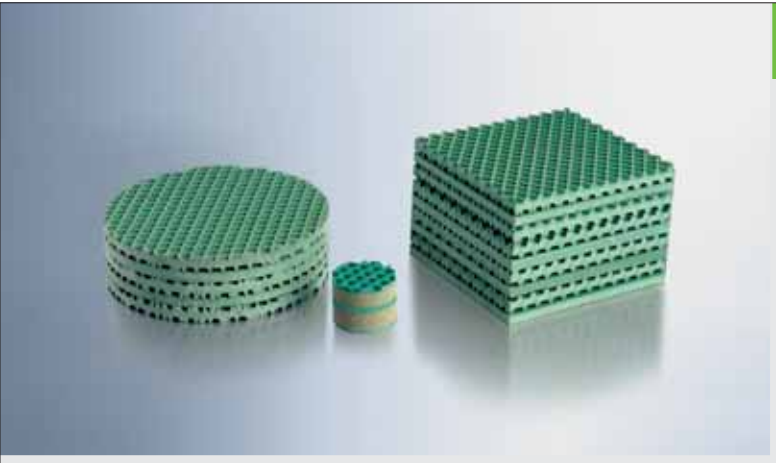
Special dimensions:
It's possible to supply special dimensions, higher loads, stainless steel solutions or a high-end solution with the BILZ AIS system available upon request

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
- BiAir® mechanical pneumatic level control (level accuracy of plus/minus 0.01 mm) and a pneumatic service unit.

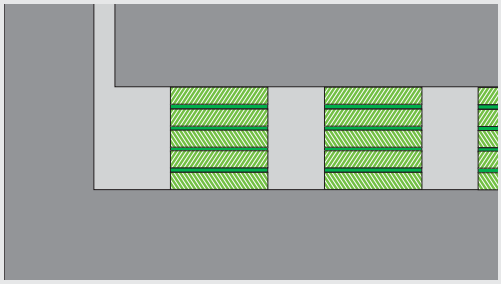
Zeiss roundness measuring machine



Reference:
Miele, first step, installing insulation plates

Sets of insulating plates

By using multiple layers of insulating plates is it 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.

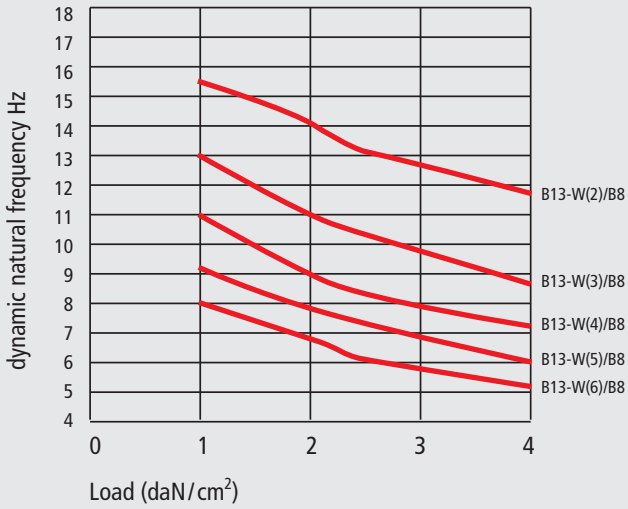


Standard sizes

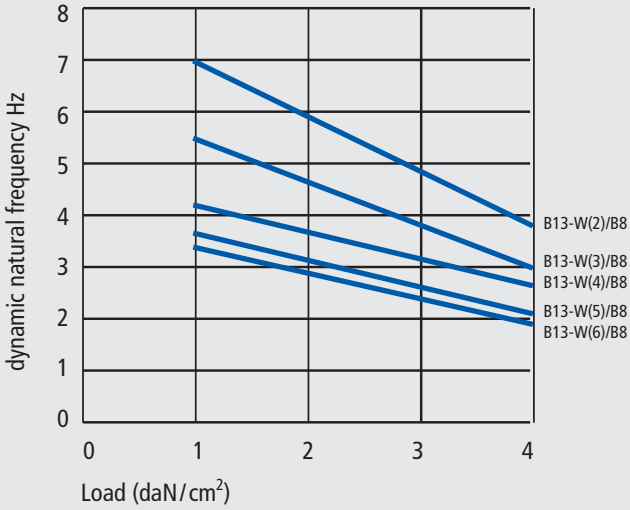
type	Free height in mm	dynamic natural frequency vertical (Hz)	dynamic natural frequency horizontal (Hz)
B13W/B8 2-fach	34	12	4
B13W/B8 3-fach	55	9	3
B13W/B8 4-fach	76	7	3
B13W/B8 5-fach	97	6	2
B13W/B8 6-fach	118	5	2

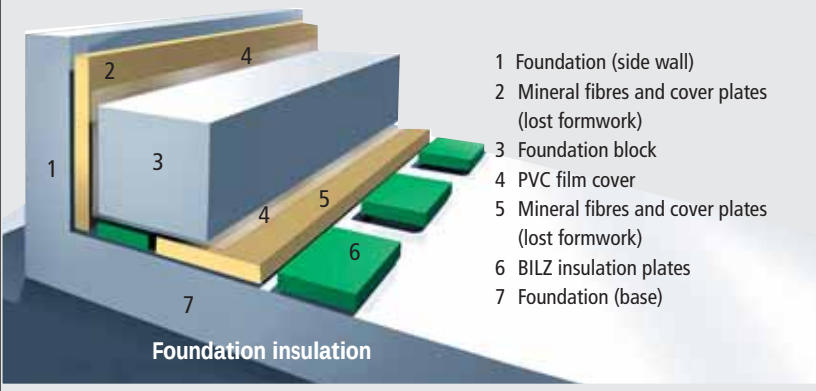
The allowable load of a set of plates with 500 x 500 mm is 2.5-20 tons. BILZ can deliver the plate sets in sizes up to 1000 x 500 mm base. BILZ can create a custom plate set using other combinations of isolation plates to fine tune the isolation properties. Your local BILZ representative can meet with your to discuss your application in detail.

dynamic natural frequency vertical



dynamic natural frequency horizontal





Foundation insulation

1 Foundation (side wall)
2 Mineral fibres and cover plates (lost formwork)
3 Foundation block
4 PVC film cover
5 Mineral fibres and cover plates (lost formwork)
6 BILZ insulation plates
7 Foundation (base)

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.

"Lost form working technology"

Precast form, steel mould

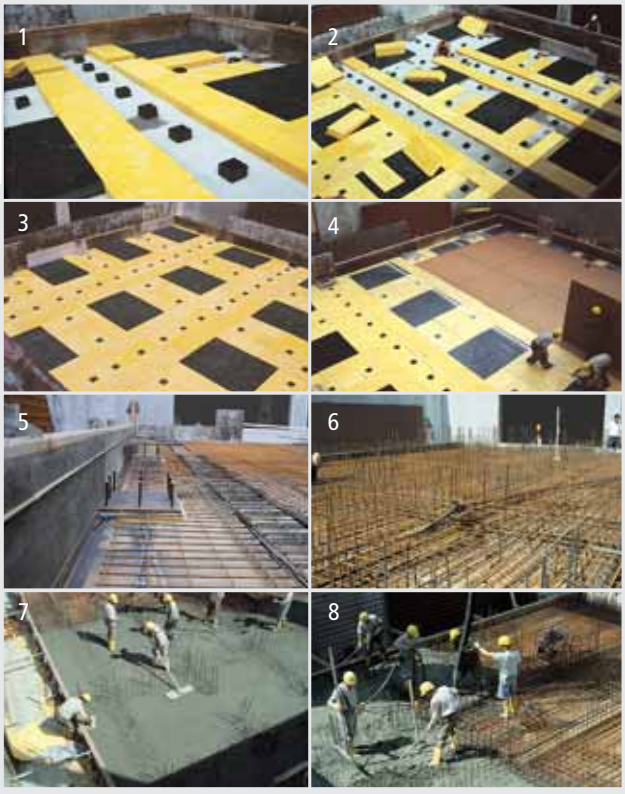


Illustration 1, 2, 3: Depositing of BILZ insulation plates (green) and padding of the spaces with mineral fibre insulation plates (sacrifice formwork). Illustration 4: Covering of the entire area first with PVC sheeting as used for construction work, and then with mineral fibre cover plates. All joints must be pasted/glued together.
Illustration 5, 6: Mounting of reinforcement. Illustration 7, 8: Filling in of concrete.

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.

Fundamentisolation with Air-springs:

Equipment: vibration isolated Inertia Block (about 20 to.) on BILZ® – Membrane – Air-Spring-System BiAir® 4-ED with mechanic-pneumatic level control MPN-LCV-HF

Special request:

Because of surrounding machines, crane runaway etc. installation of an isolation system is difficult. Workpieces with ca. 10 ton. creates a large change in loading on the isolation system. To compensate for this, a high flow mechanic-pneumatic level control with level accuracy ca. 0.1 mm is needed.

Vibration insulation of automobile test stands

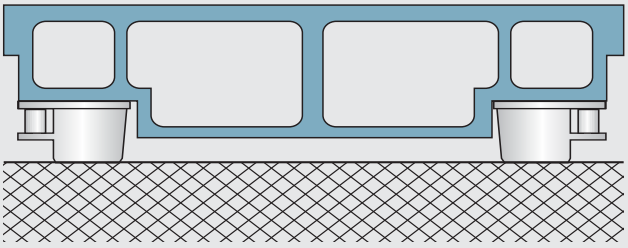
In recent years, ever higher requirements of test stands and test systems for the automobile industry have led to the need for improved performance of vibration isolation systems. BILZ air-springs with level control systems are ideally suited for this demanding application.

BILZ services:

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

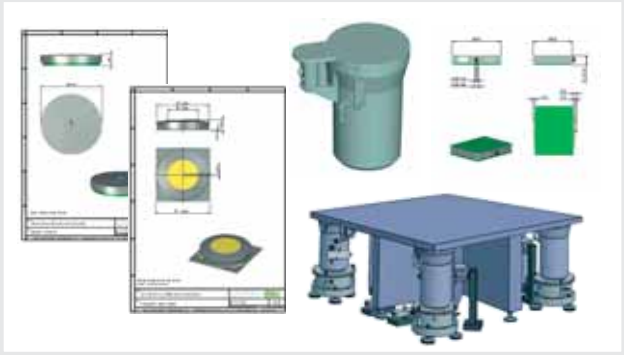
Please ask for our special literature on this topic!

Custom-made leveling elements

Add-on air volume
for membrane air spring
to reduce the
natural frequency

Custom-made products

We can also offer you cost-effective, custom-made products. We can meet your requirements in form, size and special functions, please ask our engineering team for help.

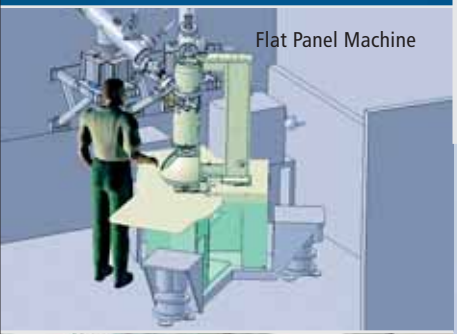


CAD-Data

BILZ can provide CAD-Data for all of the products we offer. These can be used to easily integrate our products into your machine design.
Files are available in the platform independent data type "STEP", please ask us for desired files.

ComPASS PRO Wafer inspection machine

Lab table with active isolation



Flat Panel Machine

BILZ-Testfields

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.

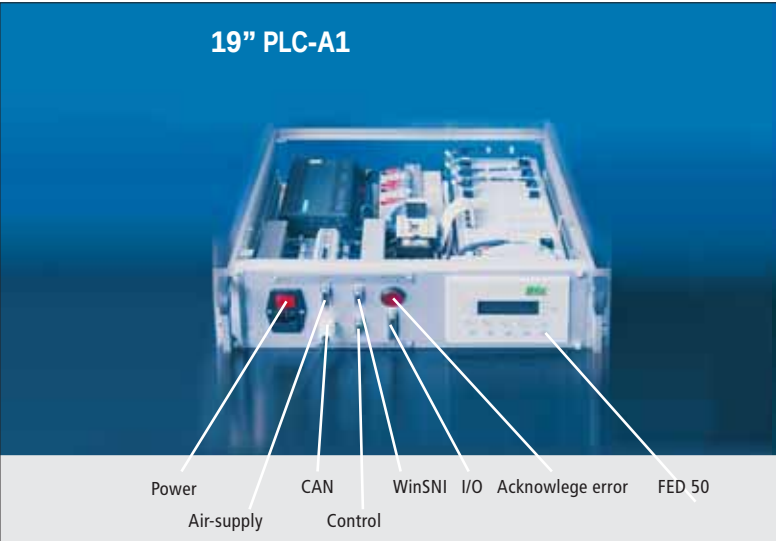
Controller SPC-LC

AIS™ Design

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 micro-processor 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 feed-forward 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.

19” PLC-A1



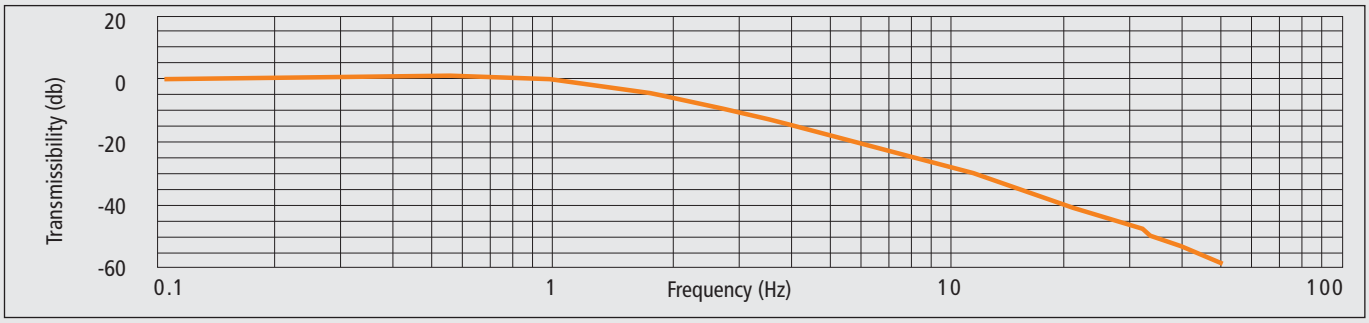
w/h/d/ 483 x 133 x 348 mm

19” AirBox-A1

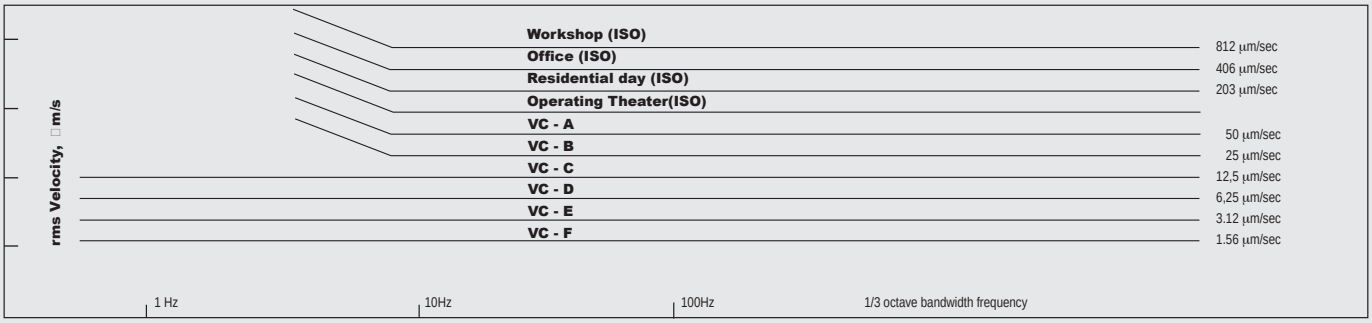
w/h/d/ 483 x 177 x 348 mm

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 ™



Vibrations criteria, VC

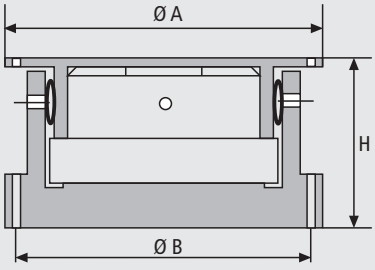


Example of positioning of AIS™ system air-springs, controllers and valves with 6 degrees of freedom

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 B (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



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.

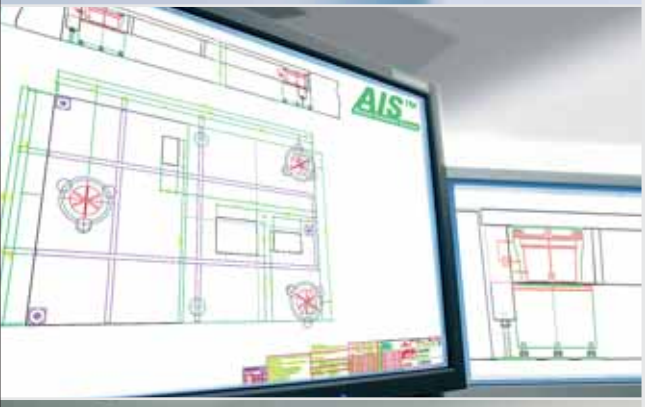
Design

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 customize 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 (<6μm/s) and VC-E (<3μm/s). This allows our customers to reach specification from nano to sub-angstrom resolution.

AIS™ Active Isolation System

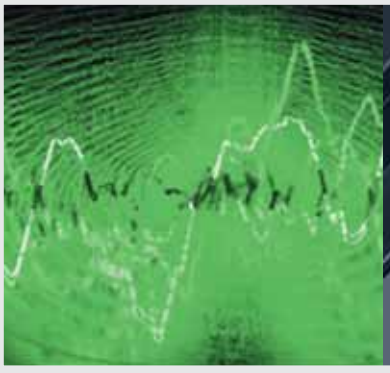
Measurement-technological vibration analysis

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.

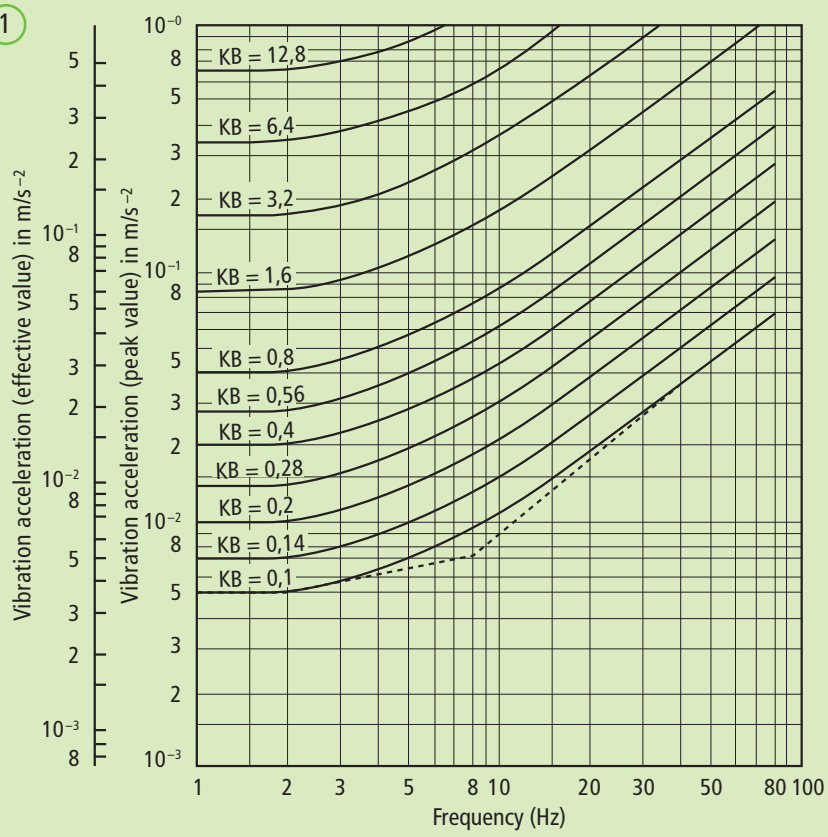
To this end oscillation accelerations within a given frequency spectrum (1–100 Hz) are taken down, because a simple summation value measurement would give only an approximate indication of the exact environmental conditions. The evaluation of the power-path signals takes place with a Fast Fourier analyser, 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 µm/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.



**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.**

1



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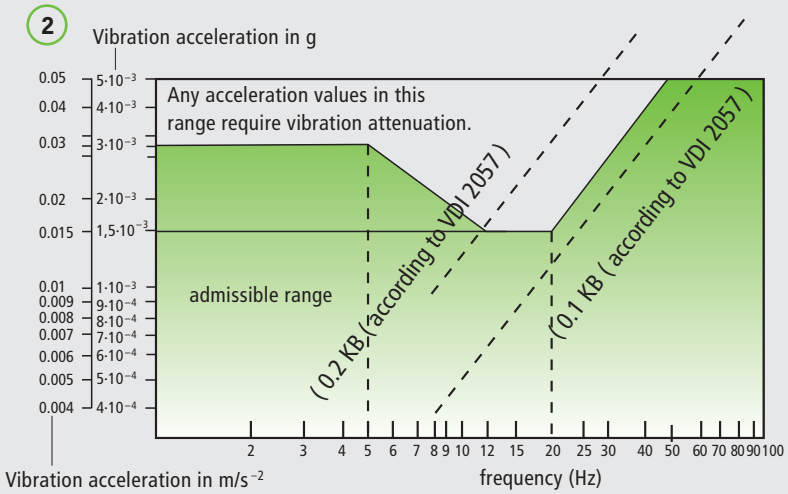

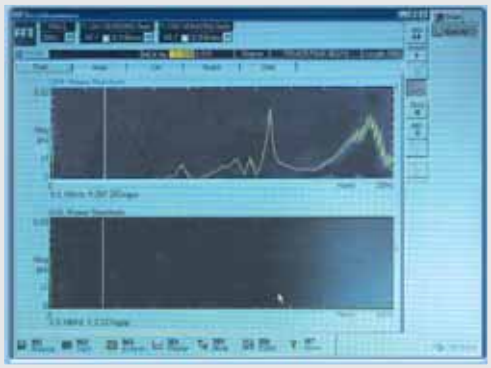

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