N

400

300

200

100

0

1

SCHWINGMETALL®
The Original
Rubber-To-Metal
Bonding from
ContiTech

** Continental**
CONTITECH

Layout of Elastic Mounting

Choice of SCHWINGMETALL® Parts in Five Steps:

1. For the layout of a mount, first the excitation vibration range and the insulation degree are evaluated. An insulation degree of more than 75% should be aimed for. During the evaluation of the diagram, the linear static spring deflection and the natural frequency of the system are depicted at the intersection of the excitation vibration value and the insulation degree.

2. The depicted linear static spring deflection and the force affecting the viewed supporting point are the basis for the calculation of the required spring travel:

$$\text{spring stiffness } c \left[\frac{N}{mm}\right] = \frac{\text{load } F\,[N]}{\text{spring travel } s\,[mm]}$$

3. In the chapter **Products and Applications**, you can choose part types that best fit the intended use (see pages 8-13).

4. In the table of the chosen part group, please choose a part that has a higher spring stiffness and max. load in the viewed direction than arise at the supporting point.

5. Finally, the following formula can be used to calculate the actual insulation degree:

$$\text{isolation degree } \eta = 1 - \frac{1}{\left(\dfrac{\text{excitation vibration range } v_{err}}{\text{natural frequency } v_e}\right)^2 - 1}$$

The chapter **Characteristics and Theory** contains detailed explanations and examples of elastic mount layouts (see pages 80-105).
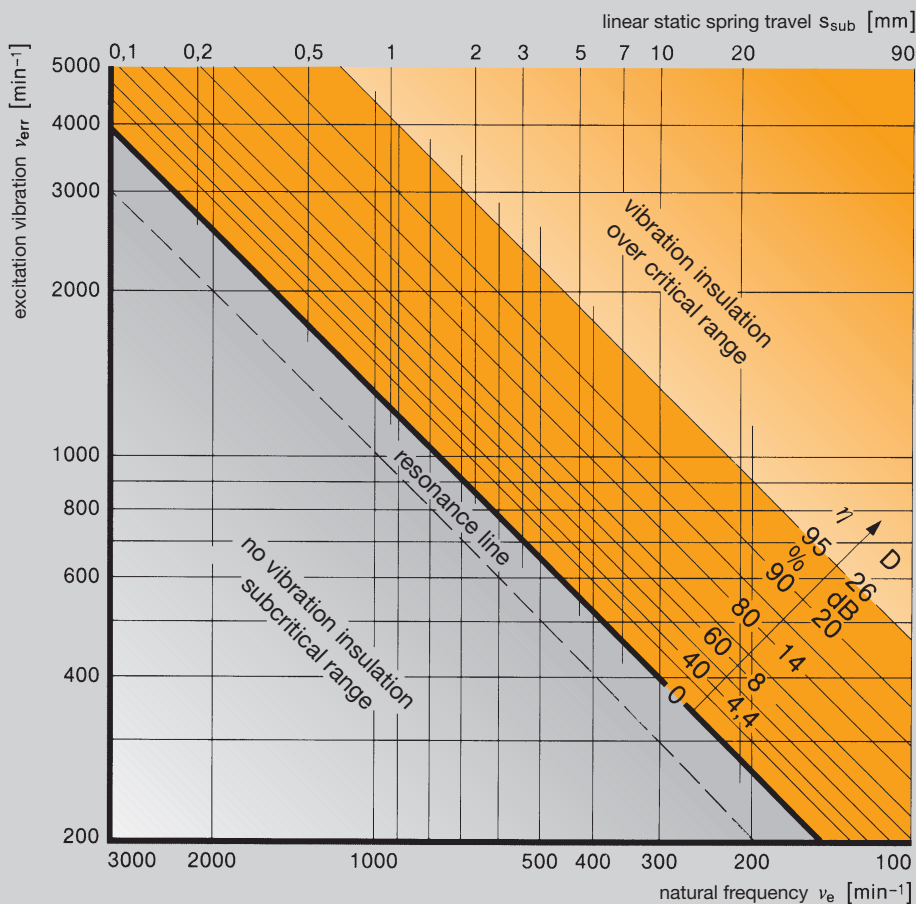
Insulation degree η and insulation value D of an undamped single mass oscillator depending on excitation and natural frequency range resp. on the linear static spring travel.

Instructions for Catalog Use

Technical Details

The product descriptions in the catalog contain the following details.

Dimensions
The dimensions are shown either next to the part charts or similar parts in the tables.

Spring Stiffness
Spring stiffness is calculated on the basis of the three spatial directions. For parts exposed to impact stress, the data is displayed as force and energy range diagrams.

Max. Loads
Maximum loads refer to static loads that may be superimposed by dynamic forces. In some special cases, higher loads may be authorized upon request.

Mass
Mass refers to a certain part and is a guide value.

Elastomer
Natural rubber is used as a standard elastomer in the SCHWINGMETALL® products in the given hardness ranges. If other elastomers are used, the respective elastomer is specially listed.

Mould No.
The mould number describes the geometry of the part.

Part No.
The part number is required for the order because the geometry, elastomer type and hardness are defined by it.

Directions of Loading
In the tables, the directions of loading of each part are depicted. The third direction is shown vertically in comparison to the other two. If only one direction of loading is shown, the part should only be strained in this direction.

Ordering Instructions

The SCHWINGMETALL® product range covers a very wide range of applications and is divided into the part groups Classic, Classic Plus and Premium.

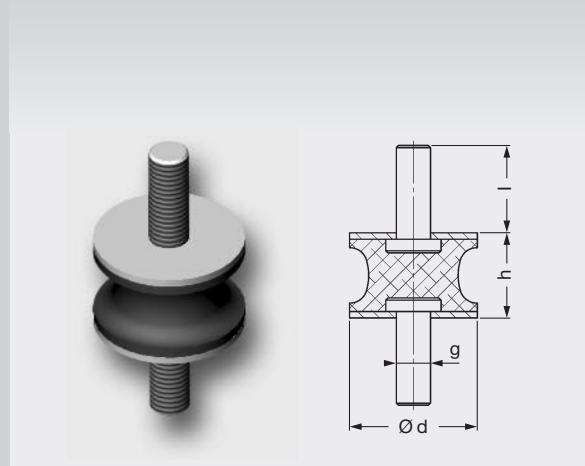Please observe the following instructions for your inquiries or orders.

The part number is required for inquiries or orders for standard parts. The following information must also be submitted:

▷ part description

▷ mould number

▷ elastomer hardness

For special applications, special elastomer hardnesses or materials (e. g. chloroprene or nitrile rubber) can be provided. Special metal parts can also be delivered. These parts that must be specially manufactured can be delivered upon request. ContiTech also delivers special parts made-to-order. Please contact our sales department.

Online Catalog

For further information, please refer to our online catalog at www.schwingmetall.com.
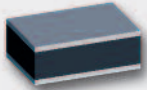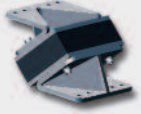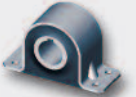
Compression Mounts AK Type													
Dimensions				Spring Stiffness			Max. Load			Mass	Elastomer	Form No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
20	15	19.0	M6	11	11	48	350	350	290	0.017	40	58302	3916408000

Load Directions

Contents

Vibration Control Solutions - From Layout to Production
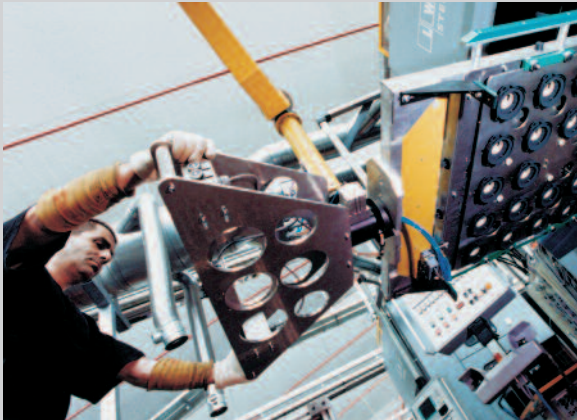
Standard products for economic solutions

Our rubber-to-metal bonded parts reduce vibrations and structure-borne sound, insulate machine vibrations, reduce accelerations and protect against noise. Optimal material choice and state-of-the-art production processes guarantee economically convincing product solutions tailored to suit market needs that fulfill every type of requirement of the automotive industry as well as in the machine and apparatus construction field.

The SCHWINGMETALL® product program contains 500 standard parts. Special requirements can therefore be quickly met.

SCHWINGMETALL® Classic

The tried and tested basic products of recognized quality, e. g. compression mounts. They are functional, flexible and universally useable where there is need for the resilient support or lightweight to medium-weight masses in all areas of building machinery, equipment and engines. A large range of types and sizes with various metal-part connections allows limitless designs for various applications.

SCHWINGMETALL® Classic Plus

The technically enhanced products with added benefits, e. g. combi mounts. They increase the functionality and are suitable for inclined mounting situations involving lateral forces. They provide excellent lateral stability of the masses they support at natural frequencies down to 3.7 Hz. When bolted to a machine and it base plate, they are particularly effective giving the same spring values vertically and horizontally.

SCHWINGMETALL® Premium
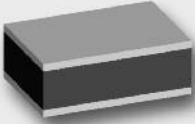
Products and modules with advanced properties and functions, e. g. hydraulic mounts or springs. They provide reliable solutions at the highest technical level in the resilient support of all types of machinery, equipment and engines. They are suitable for units and apparatus with continuous and intermittent excitation forces. They minimize the transmission of vibrations in engine mounts, cabs and gear boxes etc. and have exceptional damping properties.

Products and Applications
SCHWINGMETALL® Classic

SCHWINGMETALL® Compression Mounts

preferred for mounting of lightweight or medium-weight masses in all fields of building machinery, equipment and engines. A wide range of types and sizes with various metal part connections allows limitless designs for various applications.

		Mass per Element [1]		Natural Frequency [2]
		from	to	from
Type A, B, C	Standard element for various applications for normal application requirements. Pressure and thrust resistant. Various metal part connections for limitless designs.	5 kg	1700 kg	300 min^{-1}
Type AK	For heavy masses with small dimensions.	30 kg	450 kg	300 min^{-1}
Type D, S	Non-screw attachment for assembly of equipment with low excitation forces.	90 kg	400 kg	300 min^{-1}

SCHWINGMETALL® Railstrips (Type 1 and 2)

especially for mounting of heavy or heaviest machines, aggregates and foundations. A structured program for individual solutions. The railstrip lengths can be adapted to the respective loads. Therefore, SCHWINGMETALL® railstrips are especially suitable for mounting different loads at each mounting point.

		Mass per Element [1]		Natural Frequency [2]
		from	to	from
Type 1, 2	All-purpose mounts for very heavy masses. Choice of railstrip length allows load adaption. Therefore well suited for mounting with asymmetrical center of gravity.	160 kg	4000 kg	300 min^{-1}
U-Shaped Railstrip	Medium range of natural frequency in vertical direction with very good lateral stability. Choice of railstrip length allows load adaption. Therefore well suited for mounting with asymmetrical center of gravity.	20 kg	150 kg	360 min^{-1}

[1] Masses refer to maximum loads. [2] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Classic

SCHWINGMETALL® Buffers	
	are used together with elastic mounts in order to limit vibration amplitudes. Special designs suited for soft absorption of moving masses with high kinetic energy.
Impact Mounts	Buffer part with medium-sized spring rates for the absorption of medium-sized energy.
Heavy-duty impact mounts	Buffer part for the absorption of high energy values at high ultimate power rates.
Parabolic spring	Buffer part with soft characteristic curves. Large spring rates and high ultimate power rates for high amount of energy absorption.

SCHWINGMETALL® Classic Plus

SCHWINGMETALL® Cone Mounts			
	All-purpose equipment mounts for medium-weight loads. A good lateral stability is attained with the high radial stiffness with regard to axial stiffness. Respective washers delivered for bearing surfaces resp. breakaway control.		
		Mass per Element[1)] from to	**Natural Frequency[2)]** from
	High axial spring rates and good radial behavior, suited for medium-sized loads.	20 kg 500 kg	390 min^{-1}
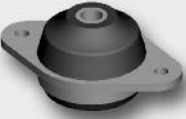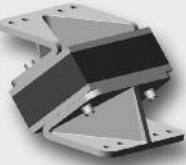
SCHWINGMETALL® Dome Mounts			
	solve the problems of level regulated machine and equipment mounting with non screw attachment. By means of level regulation, machines and equipment can be aligned exactly according to height. The underlay makes mounting with non screw attachment possible. For light up to medium-weight shear forces.		
		Mass per Element[1)] from to	**Natural Frequency[2)]** from
Dome Mounts	Heavy-duty spring mounts. Almost equal spring rates in vertical and lateral direction.	30 kg 2000 kg	430 min^{-1}
Dome Mounts AS Series	Dome mount with tear off safety and square flange with 4 base screw attachments.	150 kg 1000 kg	430 min^{-1}
Dome Mounts C Series	Square dome mount with 2 base screws.	30 kg 750 kg	380 min^{-1}

[1)] Masses refer to maximum loads. [2)] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Classic Plus

SCHWINGMETALL® Flange Mounts

are simple to install robust mounts for medium-weight loads. Installation with washers on top and on the bottom guarantees tear off safety. The washers are not part of the scope of delivery.

		Mass per Element[1] from	to	Natural Frequency[2] from
Flange Mounts	Adjusting the required washers makes the mount more sturdy in pressure and tension directions.	60 kg	240 kg	300 min^{-1}
Flange Mounts B Series	Adjusting the required washers makes the mount more sturdy in pressure and tension directions.	40 kg	460 kg	650 min^{-1}

SCHWINGMETALL® Inclined Mounts

with compression mounts or railstrips are designed for inclined mounting and natural frequencies up to 3.7 Hz with very good lateral stability. Designs for loads of 100 kg up to 4,500 kg per part make combinations for mounts for supported parts of any size with variable and simple installation possible.
Installation Instruction: Inclined mounts cause shear forces due to a wedge effect that must be absorbed by the base plate. The shear force per element may be of a maximum equal to the vertical force ($F_{Qmax} = F_H$).

		Mass per Element[1] from	to	Natural Frequency[2] from
Combi Mounts with Compression Mounts	Same spring characteristics in vertical and lateral directions. Low natural frequency. Very good stability of mounted masses in lateral direction.	100 kg	400 kg	220 min^{-1}
Combi Mounts with Railstrips	Same spring characteristics in vertical and lateral directions. Low natural frequency. Very good stability of mounted masses in lateral direction. Distinctly heavier masses than combi part with buffer.	750 kg	4500 kg	220 min^{-1}
Angled Railstrips	Same spring characteristics in vertical and lateral directions. Low natural frequency. Very good stability of mounted masses in lateral direction.	250 kg	900 kg	250 min^{-1}

[1] Masses refer to maximum loads. [2] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Classic Plus

SCHWINGMETALL® Torsion Mounts

Ring Mounts

The four part outer ring is pressed into an undersized bored hole. In this way, a shaft installed in the inner bushing will be elastically mounted.

		Mass per Element[1]		Natural Frequency[2]
		from	to	from
	Principally for distortion wear. Also suited for lateral loads.	40 kg	190 kg	670 min^{-1}

Torsion Bushings

Torque can be transmitted shock-free by means of torsion bushings. The elasticity of this bushing allows small alignment and angle defects on both shaft ends.

		Mass per Element[1]		Natural Frequency[2]
		from	to	from
	Principally for distortion wear. Also suited for lateral loads.	40 kg	190 kg	670 min^{-1}

Torsion Mounts
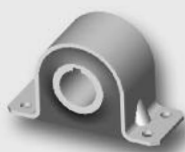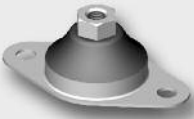
are designed to fasten shaft ends elastically on flat surfaces. This part allows axial, radial, torsional and gimbaled movements, each with their own specific spring stiffness.

		Mass per Element[1]		Natural Frequency[2]
		from	to	from
	Maintenance-free, elastic hinge bearing. Simple installation.	80 kg	200 kg	770 min^{-1}

[1] Masses refer to maximum loads. [2] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Classic Plus

SCHWINGMETALL® Special Mounts			

Bell Mounts

designed as mounts for hanging masses.

	Mass per Element[1] from	to	Natural Frequency[2] from
Parts with tear off safety for absorption of statical tensile forces.	10 kg	300 kg	360 min^{-1}

Heavy-Duty Mounts

are all-purpose equipment mounts. They are generally installed to maintain static load in the z direction. In this way, a convenient coordination in the vertical direction, stability in the lateral direction (good, if this is the driving direction in case of mount problems in vehicles) and softness in the lateral direction are achieved. Heavy-duty mounts can be delivered with tear off safety.

	Mass per Element[1] from	to	Natural Frequency[2] from
Different spring rates for the three spatial directions.	70 kg	1000 kg	330 min^{-1}

Instrument Mounts

This design is suited for light masses. Ensures same stiffness in vertical and lateral directions.

	Mass per Element[1] from	to	Natural Frequency[2] from
Suited for mounting light masses with low natural frequencies.	10 kg	220 kg	260 min^{-1}

Shear Mounts

Especially suited for mounting light masses with low natural frequencies. These parts protect e. g. sensitive instruments, measuring and display equipment or switch cabinets against vibrations.

	Mass per Element[1] from	to	Natural Frequency[2] from
Suited for mounting light masses with low natural frequencies.	8 kg	25 kg	200 min^{-1}

[1] Masses refer to maximum loads. [2] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Premium

SCHWINGMETALL® Hydromounts

Hydromounts V Series

These components are suited for light to medium-weight masses and especially interesting, if, besides vibrations, interfering impacts arise and the natural frequencies of the system should subside quickly (example: cabin mounts in industrial trucks). This is achieved by hydraulic damping.

	Mass per Element[1]		Natural Frequency[2]
	from	to	from
Mounts with integrated hydraulic damping. Also designed to absorb impact energy.	10 kg	400 kg	370 min^{-1}

Hydromounts V plus Series

This hydromount is characterized by an integrated, broadband damping in the vertical direction and therefore damps impacts especially well. Furthermore, it has an integrated stopper disk. Mainly used for cabin mounting for forklifts as well as engine mounts for various industrial vehicles.

	Mass per Element[1]		Natural Frequency[2]
	from	to	from
Hydromount V 1500 plus with compact design and integrated hydraulic damping.	50 kg	250 kg	420 min^{-1}

Hydromounts K Series

Robust Hydromount K series with tear off safety. Especially designed as a mount for heavy construction vehicle cabins due to its high transverse rigidity and hydraulic damping in the vertical direction. May also be used as mount for large machines. Also available without hydraulic damping with the same mounting dimensions.

	Mass per Element[1]		Natural Frequency[2]
	from	to	from
Mounts for middle-weight masses with good lateral stability.	100 kg	350 kg	390 min^{-1}

[1] Masses refer to maximum loads. [2] The natural frequency rates refer to the lowest standard elastomer hardness at maximum load.

SCHWINGMETALL® Compression Mounts

Compression Mounts A Type

Dimensions				Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
15	8	10	M4	11	11	92	35	35	90	0.006	40	21682/A	3911403000
15	8	10	M4	19	19	170	40	40	125	0.006	55	21682/A	3911203000
15	8	10	M4	29	29	262	43	43	160	0.006	65	21682/A	3911103000
15	15	13	M4	5	5	32	35	35	90	0.008	40	25326/A	3911404000
15	15	13	M4	9	9	62	40	40	125	0.008	55	25326/A	3911204000
15	15	13	M4	14	14	97	43	43	160	0.008	65	25326/A	3911104000
15	30	16	M4	1	1	12	34	34	90	0.011	40	25259/A	3911405000
15	30	16	M4	3	3	23	36	36	100	0.011	55	25259/A	3911205000
15	30	16	M4	4	4	37	37	37	160	0.011	65	25259/A	3911105000
20	25	19	M6	5	5	27	60	60	150	0.022	40	31658/A	3911406000
20	25	19	M6	9	9	53	65	65	180	0.022	55	31658/A	3911206000
20	25	19	M6	13	13	84	70	70	225	0.022	65	31658/A	3911106000
25	10	18.5	M6	41	41	651	100	100	250	0.019	40	25388/A	3911407000
25	10	18.5	M6	77	77	1125	110	110	400	0.019	55	25388/A	3911207000
25	10	18.5	M6	120	120	1695	120	120	500	0.019	65	25388/A	3911107000
25	15	18.5	M6	22	22	149	100	100	250	0.022	40	20292a/A	3911408000
25	15	18.5	M6	41	41	274	110	110	400	0.022	55	20292a/A	3911208000
25	15	18.5	M6	64	64	423	120	120	420	0.022	65	20292a/A	3911108000
25	20	18.5	M6	13	13	65	100	100	250	0.025	40	20292/A	3911410000
25	20	18.5	M6	24	24	126	110	110	350	0.025	55	20292/A	3911210000
25	20	18.5	M6	37	37	198	120	120	370	0.025	65	20292/A	3911110000
25	30	18.5	M6	7	7	37	100	100	250	0.029	40	21239/A	3911411000
25	30	18.5	M6	13	13	72	110	110	300	0.029	55	21239/A	3911211000
25	30	18.5	M6	20	20	113	120	120	400	0.029	65	21239/A	3911111000
30	20	20.5	M8	20	20	112	150	150	350	0.047	40	25356/A	3911412000
30	20	20.5	M8	36	36	213	160	160	550	0.047	55	25356/A	3911212000
30	20	20.5	M8	56	56	331	170	170	650	0.047	65	25356/A	3911112000
30	30	20.5	M8	10	10	58	150	150	350	0.054	40	31660/A	3911413000
30	30	20.5	M8	17	17	112	160	160	400	0.054	55	31660/A	3911213000
30	30	20.5	M8	26	26	176	170	170	600	0.054	65	31660/A	3911113000
40	30	24.5	M8	19	19	109	250	250	630	0.092	40	20291/A	3911414000
40	30	24.5	M8	35	35	211	260	260	850	0.092	55	20291/A	3911214000
40	30	24.5	M8	54	54	330	270	270	1050	0.092	65	20291/A	3911114000
40	40	24.5	M8	12	12	69	250	250	600	0.104	40	27796/A	3911431000
40	40	24.5	M8	21	21	135	260	260	730	0.104	55	27796/A	3911231000
40	40	24.5	M8	32	32	214	270	270	890	0.104	65	27796/A	3911131000

Compression Mounts A Type

Dimensions				Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
50	20	28	M10	60	60	467	400	400	1000	0.140	40	25332/A	3911417000
50	20	28	M10	110	110	858	420	420	1450	0.140	55	25332/A	3911217000
50	20	28	M10	170	170	1321	440	440	2300	0.140	65	25332/A	3911117000
50	30	34	M10	34	34	177	400	400	950	0.165	40	25333/A	3911418000
50	30	34	M10	62	62	343	420	420	1400	0.165	55	25333/A	3911218000
50	30	34	M10	95	95	539	440	440	2000	0.165	65	25333/A	3911118000
50	45	34	M10	20	20	104	392	392	950	0.200	40	27797/A	3911419000
50	45	34	M10	35	35	204	410	410	1300	0.200	55	27797/A	3911219000
50	45	34	M10	54	54	322	430	430	1800	0.200	65	27797/A	3911119000
70	35	25	M10	69	69	423	750	750	1950	0.340	40	20290a/A	3911441000
70	35	25	M10	127	127	793	790	790	2750	0.340	55	20290a/A	3911241000
70	35	25	M10	198	198	1231	830	830	3750	0.340	65	20290a/A	3911141000
70	45	25	M10	47	47	265	750	750	1900	0.382	40	20290/A	3911420000
70	45	25	M10	86	86	507	790	790	2650	0.382	55	20290/A	3911220000
70	45	25	M10	133	133	793	830	830	3600	0.382	65	20290/A	3911120000
70	60	25	M10	31	31	162	750	750	1900	0.445	40	20290b/A	3911442000
70	60	25	M10	56	56	315	790	790	2600	0.445	55	20290b/A	3911242000
70	60	25	M10	86	86	497	830	830	3500	0.445	65	20290b/A	3911142000
75	40	37	M12	62	62	400	900	900	2200	0.445	40	25327/A	3911421000
75	40	37	M12	112	112	751	1000	1000	3500	0.445	55	25327/A	3911221000
75	40	37	M12	173	173	1166	1050	1050	4500	0.445	65	25327/A	3911121000
75	55	37	M12	39	39	214	900	900	2200	0.518	40	25336/A	3911422000
75	55	37	M12	70	70	412	1000	1000	2950	0.518	55	25336/A	3911222000
75	55	37	M12	108	108	647	1050	1050	4050	0.518	65	25336/A	3911122000
100	40	43	M16	130	130	1087	1500	1500	5200	0.910	40	25334/A	3911424000
100	40	43	M16	241	241	1972	1600	1600	7500	0.910	55	25334/A	3911224000
100	40	43	M16	375	375	3021	1700	1700	10500	0.910	65	25334/A	3911124000
100	55	43	M16	73	73	438	1500	1500	4500	1.080	40	25335/A	3911425000
100	55	43	M16	132	132	838	1600	1600	6200	1.080	55	25335/A	3911225000
100	55	43	M16	204	204	1311	1700	1700	8300	1.080	65	25335/A	3911125000
100	75	43	M16	53	53	279	1500	1500	4000	1.253	40	25328/A	3911446000
100	75	43	M16	96	96	540	1600	1600	5800	1.253	55	25328/A	3911246000
100	75	43	M16	149	149	848	1700	1700	7500	1.253	65	25328/A	3911146000

Directions of Loading

Z

X

SCHWINGMETALL® Compression Mounts

Compression Mounts B Type

Dimensions					Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l1 [mm]	l2 [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
15	15	13.0	4.5	M4	7	7	41	35	35	90	0.007	40	25326/B	3912404000
15	15	13.0	4.5	M4	12	12	77	40	40	125	0.007	55	25326/B	3912204000
15	15	13.0	4.5	M4	19	19	120	43	43	160	0.007	65	25326/B	3912104000
15	30	16.0	4.5	M4	1	1	13	34	34	90	0.010	40	25259/B	3912405000
15	30	16.0	4.5	M4	3	3	26	36	36	125	0.010	55	25259/B	3912205000
15	30	16.0	4.5	M4	4	4	41	37	37	160	0.010	65	25259/B	3912105000
20	25	19.0	6.0	M6	7	7	39	60	60	150	0.021	40	31658/B	3912406000
20	25	19.0	6.0	M6	12	12	73	65	65	180	0.021	55	31658/B	3912206000
20	25	19.0	6.0	M6	19	19	114	70	70	225	0.021	65	31658/B	3912106000
25	15	18.5	6.0	M6	42	42	250	100	100	250	0.023	40	20292a/B	3912408000
25	15	18.5	6.0	M6	80	80	445	110	110	400	0.023	55	20292a/B	3912208000
25	15	18.5	6.0	M6	125	125	676	120	120	500	0.023	65	20292a/B	3912108000
25	20	18.5	6.0	M6	18	18	74	100	100	250	0.025	40	20292/B	3912410000
25	20	18.5	6.0	M6	34	34	141	110	110	350	0.025	55	20292/B	3912210000
25	20	18.5	6.0	M6	53	53	220	120	120	450	0.025	65	20292/B	3912110000
25	30	18.5	6.0	M6	9	9	37	100	100	250	0.031	40	21239/B	3912411000
25	30	18.5	6.0	M6	16	16	72	110	110	300	0.031	55	21239/B	3912211000
25	30	18.5	6.0	M6	24	24	113	120	120	400	0.031	65	21239/B	3912111000
30	20	20.5	7.0	M8	24	24	112	150	150	350	0.045	40	25356/B	3912412000
30	20	20.5	7.0	M8	43	43	212	160	160	500	0.045	55	25356/B	3912212000
30	20	20.5	7.0	M8	67	67	330	170	170	600	0.045	65	25356/B	3912112000
30	30	30.0	7.0	M8	11	11	66	150	150	350	0.052	40	31660/B	3912413000
30	30	30.0	7.0	M8	20	20	126	160	160	420	0.052	55	31660/B	3912213000
30	30	30.0	7.0	M8	31	31	196	170	170	600	0.052	65	31660/B	3912113000
40	30	24.5	7.0	M8	25	25	140	250	250	630	0.084	40	20291/B	3912414000
40	30	24.5	7.0	M8	46	46	262	260	260	850	0.084	55	20291/B	3912214000
40	30	24.5	7.0	M8	71	71	406	270	270	1050	0.084	65	20291/B	3912114000
40	40	24.5	7.0	M8	13	13	79	250	250	600	0.096	40	27796/B	3912426000
40	40	24.5	7.0	M8	23	23	151	260	260	730	0.096	55	27796/B	3912226000
40	40	24.5	7.0	M8	36	36	238	270	270	890	0.096	65	27796/B	3912126000

Compression Mounts B Type

Dimensions					Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l_1 [mm]	l_2 [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
50	20	28.0	8.8	M10	71	71	938	400	400	1000	0.122	40	25332/B	3912417000
50	20	28.0	8.8	M10	132	132	1645	420	420	1450	0.122	55	25332/B	3912217000
50	20	28.0	8.8	M10	206	206	2486	440	440	2300	0.122	65	25332/B	3912117000
50	30	34.0	8.8	M10	40	40	201	400	400	950	0.150	40	25333/B	3912418000
50	30	34.0	8.8	M10	74	74	384	420	420	1400	0.150	55	25333/B	3912218000
50	30	34.0	8.8	M10	115	115	600	440	440	1800	0.150	65	25333/B	3912118000
50	45	34.0	8.8	M10	20	20	104	390	390	950	0.180	40	27797/B	3912419000
50	45	34.0	8.8	M10	35	35	204	410	410	1300	0.180	55	27797/B	3912219000
50	45	34.0	8.8	M10	54	54	322	430	430	1800	0.180	65	27797/B	3912119000
70	45	25.0	8.8	M10	47	47	265	750	750	1900	0.347	40	20290/B	3912420000
70	45	25.0	8.8	M10	86	86	507	790	790	2650	0.347	55	20290/B	3912220000
70	45	25.0	8.8	M10	133	133	793	830	830	3600	0.347	65	20290/B	3912120000
75	40	37.0	11.5	M12	62	62	400	900	900	2200	0.419	40	25327/B	3912421000
75	40	37.0	11.5	M12	112	112	751	1000	1000	3500	0.419	55	25327/B	3912221000
75	40	37.0	11.5	M12	173	173	1166	1050	1050	4500	0.419	65	25327/B	3912121000
75	55	37.0	11.5	M12	46	46	242	900	900	2200	0.487	40	25336/B	3912422000
75	55	37.0	11.5	M12	84	84	461	1000	1000	2950	0.487	55	25336/B	3912222000
75	55	37.0	11.5	M12	130	130	720	1050	1050	4050	0.487	65	25336/B	3912122000
100	40	43.0	17.0	M16	156	156	1359	1500	1500	5200	0.889	40	25334/B	3912424000
100	40	43.0	17.0	M16	290	290	2427	1600	1600	7500	0.889	55	25334/B	3912224000
100	40	43.0	17.0	M16	453	453	3695	1650	1650	10500	0.889	65	25334/B	3912124000
100	55	43.0	17.0	M16	86	86	496	1500	1500	4500	1.026	40	25335/B	3912425000
100	55	43.0	17.0	M16	158	158	937	1600	1600	6200	1.026	55	25335/B	3912225000
100	55	43.0	17.0	M16	246	246	1458	1700	1700	8300	1.026	65	25335/B	3912125000
100	75	43.0	17.0	M16	53	53	279	1500	1500	4000	1.200	40	25328/B	3912446000
100	75	43.0	17.0	M16	96	96	540	1600	1600	5800	1.200	55	25328/B	3912246000
100	75	43.0	17.0	M16	149	149	848	1700	1700	7500	1.200	65	25328/B	3912146000

Directions of Loading

SCHWINGMETALL® Compression Mounts

Compression Mounts C Type

Dimensions				Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
13	26	5.0	M4	2	2	13	25	25	65	0.009	40	21887/C	3913402000
13	26	5.0	M4	3	3	25	27	27	80	0.009	55	21887/C	3913202000
13	26	5.0	M4	4	4	40	29	29	110	0.009	65	21887/C	3913102000
15	15	4.5	M4	13	13	68	35	35	90	0.007	40	25326/C	3913404000
15	15	4.5	M4	24	24	125	40	40	125	0.007	55	25326/C	3913204000
15	15	4.5	M4	37	37	190	43	43	160	0.007	65	25326/C	3913104000
20	25	6.0	M6	8	8	39	60	60	150	0.020	40	31658/C	3913406000
20	25	6.0	M6	14	14	73	65	65	180	0.020	55	31658/C	3913206000
20	25	6.0	M6	22	22	114	70	70	225	0.020	65	31658/C	3913106000
30	20	7.0	M8	30	30	230	150	150	400	0.042	40	25356/C	3913412000
30	20	7.0	M8	56	56	410	160	160	500	0.042	55	25356/C	3913212000
30	20	7.0	M8	87	87	626	170	170	650	0.042	65	25356/C	3913112000
30	30	7.0	M8	13	13	74	150	150	350	0.051	40	31660/C	3913413000
30	30	7.0	M8	24	24	139	160	160	420	0.051	55	31660/C	3913213000
30	30	7.0	M8	37	37	217	170	170	600	0.051	65	31660/C	3913113000
40	30	7.0	M8	29	29	189	250	250	630	0.072	40	20291/C	3913414000
40	30	7.0	M8	54	54	346	260	260	850	0.072	55	20291/C	3913214000
40	30	7.0	M8	83	83	533	270	270	1050	0.072	65	20291/C	3913114000
40	40	7.0	M8	14	14	89	250	250	600	0.090	40	27796/C	3913415000
40	40	7.0	M8	25	25	168	260	260	730	0.090	55	27796/C	3913215000
40	40	7.0	M8	39	39	263	270	270	890	0.090	65	27796/C	3913115000
50	45	8.8	M10	23	23	119	390	390	950	0.169	40	27797/C	3913419000
50	45	8.8	M10	42	42	228	410	410	1300	0.169	55	27797/C	3913219000
50	45	8.8	M10	65	65	358	430	430	1800	0.169	65	27797/C	3913119000
70	45	8.8	M10	71	71	529	750	750	1900	0.317	40	20290/C	3913420000
70	45	8.8	M10	132	132	953	790	790	2650	0.317	55	20290/C	3913220000
70	45	8.8	M10	207	207	1457	830	830	3600	0.317	65	20290/C	3913120000
75	55	11.5	M12	55	55	272	900	900	2200	0.455	40	25336/C	3913422000
75	55	11.5	M12	101	101	512	1000	1000	2950	0.455	55	25336/C	3913222000
75	55	11.5	M12	157	157	796	1050	1050	4050	0.455	65	25336/C	3913122000

Compression Mounts C Type

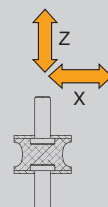| Dimensions				Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
100	55	17.0	M16	103	103	561	1700	1700	4500	0.990	40	25335/C	3913425000
100	55	17.0	M16	191	191	1045	1900	1900	6200	0.990	55	25335/C	3913225000
100	55	17.0	M16	297	297	1619	2100	2100	8300	0.990	65	25335/C	3913125000
100	75	17.0	M16	53	53	279	1500	1500	4000	1.165	40	25328/C	3913426000
100	75	17.0	M16	96	96	540	1600	1600	5800	1.165	55	25328/C	3913226000
100	75	17.0	M16	149	149	848	1700	1700	7500	1.165	65	25328/C	3913126000
150	55	20.0	1)	216	216	1948	3500	3500	11000	2.500	40	31475/C	3913427000
150	55	20.0	1)	398	398	3511	3750	3750	16000	2.500	55	31475/C	3913227000
150	55	20.0	1)	621	621	5363	4000	4000	21000	2.500	65	31475/C	3913127000
150	75	20.0	1)	139	139	858	3500	3500	9500	2.950	40	25303/C	3913428000
150	75	20.0	1)	254	254	1613	3750	3750	14500	2.950	55	25303/C	3913228000
150	75	20.0	1)	395	395	2507	4000	4000	19000	2.950	65	25303/C	3913128000
200	100	20.0	1)	160	160	929	6000	6000	17500	5.920	40	25329/C	3913429000
200	100	20.0	1)	291	291	1802	6400	6400	25000	5.920	55	25329/C	3913229000
200	100	20.0	1)	451	451	2834	6800	6800	33500	5.920	65	25329/C	3913129000

1) suitable for screw up to M20; diameter of the inner part 40 mm
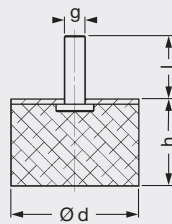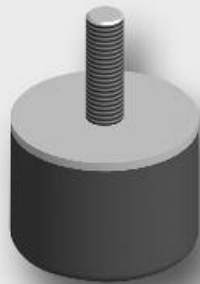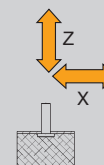
Directions of Loading

Z

X

SCHWINGMETALL® Compression Mounts

Compression Mounts AK Type

Dimensions				Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
20	15	19.0	M6	11	11	48	350	350	290	0.017	40	58302	3916408000
20	15	19.0	M6	19	19	99	50	50	320	0.017	55	58302	3916208000
20	15	19.0	M6	30	30	154	60	60	420	0.017	65	58302	3916108000
30	20	20.5	M8	13	13	92	60	60	580	0.042	40	58236	3916416000
30	20	20.5	M8	23	23	180	90	90	720	0.042	55	58236	3916216000
30	20	20.5	M8	36	36	275	105	105	900	0.042	65	58236	3916116000
50	30	34.0	M10	18	18	134	120	120	1450	0.146	40	58237	3916424000
50	30	34.0	M10	32	32	272	250	250	1800	0.146	55	58237	3916224000
50	30	34.0	M10	49	49	406	270	270	2200	0.146	65	58237	3916124000
75	40	37.0	M12	33	33	295	350	350	3900	0.386	40	58238	3916430000
75	40	37.0	M12	59	59	530	600	600	4500	0.386	55	58238	3916230000
75	40	37.0	M12	91	91	834	650	650	5000	0.386	65	58238	3916130000

Directions of Loading

Compression Mounts AK Type

Dimensions				Spring Stiffness			Max. Loads	Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_z [N]	Piece [kg]	Hardness [Shore A]		
15	13	13.0	M4	10	10	61	110	0.005	55	25326/D	3917204000
15	28	16.0	M4	2	2	23	90	0.008	55	25259/D	3917205000
20	23	19.0	M6	9	9	53	150	0.015	55	31658/D	3917206000
25	8	18.5	M6	79	79	1038	400	0.011	55	25388/D	3917207000
25	13	18.0	M6	43	43	281	325	0.014	55	20292a/D	3917208000
25	18	18.0	M6	25	25	113	250	0.017	55	20292/D	3917210000
25	28	18.5	M6	13	13	69	250	0.022	55	21239/D	3917211000
30	28	20.5	M8	17	17	112	350	0.037	55	31660/D	3917213000
40	28	28.0	M8	37	37	209	650	0.064	55	20291/D	3917214000
40	38	24.5	M8	22	22	134	600	0.077	55	27796/D	3917231000
50	17	28.0	M10	114	114	844	1400	0.084	55	25332/D	3917217000
50	28	34.0	M10	64	64	339	1200	0.109	55	25333/D	3917218000
50	42	34.0	M10	36	36	201	1000	0.140	55	27797/D	3917219000
70	42	25.0	M10	81	81	449	2000	0.278	55	20290/D	3917220000
75	36	37.0	M12	114	114	742	2500	0.300	55	25327/D	3917221000
75	51	37.0	M12	72	72	407	2300	0.380	55	25336/D	3917222000
100	36	43.0	M16	254	254	1956	5500	0.584	55	25334/D	3917224000
100	50	43.0	M16	136	136	825	4400	0.720	55	25335/D	3917225000

Directions of Loading

SCHWINGMETALL® Compression Mounts
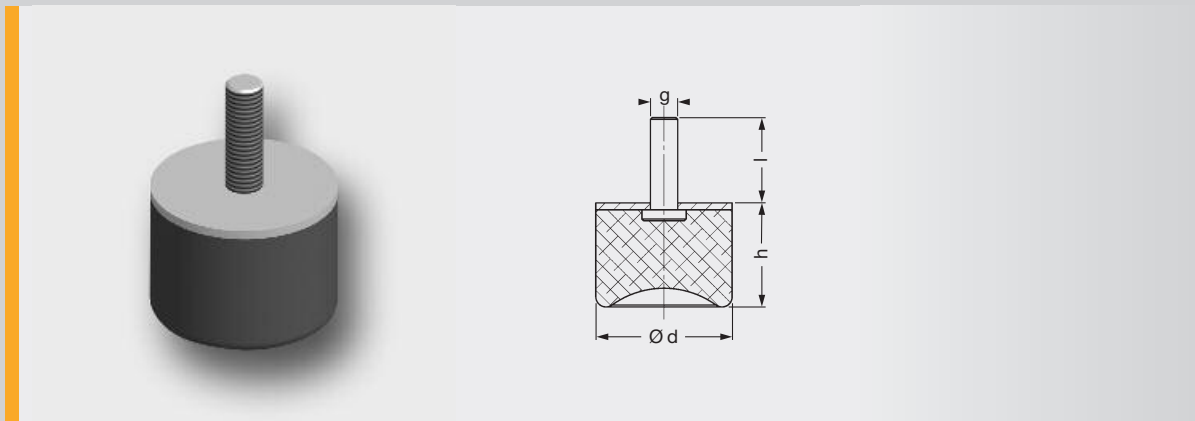
Compression Mounts S Type

Dimensions				Spring Stiffness			Max. Loads	Mass	Elas-tomer	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_z [N]	Piece [kg]	Hardness [Shore A]		
15	14.0	13.0	M4	8	8	47	100	0.005	55	25326/S	3919204000
20	23.5	23.5	M6	10	10	63	150	0.015	55	31658/S	3919206000
25	18.5	18.5	M6	21	21	95	250	0.017	55	20292/S	3919210000
30	28.5	20.5	M8	13	13	81	350	0.037	55	31660/S	3919213000
40	28.5	24.5	M8	25	25	131	600	0.061	55	20291/S	3919214000
50	28.0	34.0	M10	43	43	208	1000	0.106	55	25333/S	3919218000
70	43.0	25.0	M10	57	57	295	1900	0.264	55	20290/S	3919220000
75	37.0	43.0	M12	64	64	366	2200	0.292	55	25327/S	3919221000
100	50.0	43.0	M16	93	93	513	4100	0.690	55	25335/S	3919225000

Directions of Loading

SCHWINGMETALL® Railstrips

Railstrips Type 1

Dimensions				Spring Stiffness [1]		max. Loads [1]		Min. Natural Frequency [2]	Mass	Elastomer	Mould No.	Part No.
b [mm]	h [mm]	Length [mm]	s [mm]	$C_{x,y}$ [N/mm]	C_z [N/mm]	$F_{x,y}$ [N]	F_z [N]	ν_e min⁻¹	Piece [kg]	Hardness [Shore A]		
40	20	2000	5	27	452	100	350	1077	6.92	55	20301	3973201000
40	35	2000	10	21	209	100	300	790	13.77	55	25319a	3974202000
40	40	2000	10	18	115	100	220	683	14.21	55	25319f	3974251000
40	45	2000	10	12	79	100	200	591	14.65	55	25319	3974203000
40	50	2000	10	11	63	100	200	528	15.09	55	25319g	3974252000
50	35	2000	10	24	275	125	400	782	17.72	55	25081b	3974204000
50	45	2000	10	14	121	125	320	583	18.81	55	25081a	3974205000
50	55	2000	10	10	67	120	250	488	19.91	55	25081	3974206000
50	60	2000	10	8	53	110	250	436	20.25	55	25080a	■
50	70	2000	10	6	38	100	250	371	21.55	55	25080	3974208000
60	35	2000	10	29	549	150	550	946	20.44	55	25320	■
60	60	2000	10	10	76	135	300	475	23.58	55	25213a	■
60	80	2000	10	6	42	120	300	355	26.45	55	25213	■
70	30	2000	10	56	1263	180	650	1316	23.55	55	20300	3974213000
70	45	2000	10	24	260	180	520	669	25.84	55	25082a	3974215000
70	50	2000	10	20	157	180	400	590	26.61	55	25082c	3974254000
70	55	2000	10	17	124	175	350	563	27.37	55	25082	3974216000
70	65	2000	10	13	75	175	350	438	28.91	55	25082d	3974255000
70	80	2000	10	8	53	144	350	370	31.20	55	25321	3974217000
80	45	2000	10	22	327	200	650	670	29.75	55	25323a	■
80	80	2000	10	9	71	162	400	399	35.96	55	25323	■
100	45	2000	15	53	1376	240	800	1241	49.37	55	20299	3975222000
100	55	2000	15	30	605	225	800	823	51.65	55	25079b	■
100	60	2000	15	26	372	225	730	675	52.65	55	25079	3975224000
100	65	2000	15	22	267	225	650	605	53.86	55	24472b	■
100	70	2000	15	19	195	225	600	539	54.84	55	24472a	3975226000
100	75	2000	15	16	141	215	550	480	55.93	55	24472d	3975256000
100	80	2000	15	14	122	210	500	466	57.02	55	24472	3975227000
100	90	2000	15	12	84	200	500	388	59.20	55	24472c	3975257000

[1] The indicated stiffness and maximum loads refer to a railstrip 10 mm long.

[2] The minimal natural frequency values refer to maximum loads.

Tolerance reference dimension see drawing at www.schwingmetall.com

■ made-to-order item

Railstrips Type 1

Dimensions				Spring Stiffness [1]		max. Loads [1]		Min. Natural Frequency [2]	Mass	Elas-tomer	Mould No.	Part No.
b [mm]	h [mm]	Length [mm]	s [mm]	$C_{x,y}$ [N/mm]	C_z [N/mm]	$F_{x,y}$ [N]	F_z [N]	ν_e min^{-1}	Piece [kg]	Hardness [Shore A]		
120	45	2000	15	55	1338	260	900	1155	62.14	55	21422b	■
120	60	2000	15	37	554	260	900	743	66.50	55	21422a	■
120	70	2000	15	24	266	260	750	563	69.87	55	21422	■
150	50	2000	15	70	1573	420	1000	1186	77.48	55	21055b	■
150	60	2000	15	40	809	380	920	886	80.66	55	21055a	3975232000
150	80	2000	15	28	310	380	840	575	87.21	55	21055	3975233000
150	100	2000	15	19	142	380	760	408	93.76	55	58394	3975234000
200	70	2000	15	48	902	560	1600	710	121.50	55	38417c	3975261000
200	90	2000	15	31	350	560	1480	460	130.30	55	38417b	3975260000
200	100	2000	15	27	218	560	1360	379	134.70	55	38417	3975236000
200	110	2000	15	23	191	550	1240	371	139.10	55	38417a	3975259000

[1] The indicated stiffness and maximum loads refer to a railstrip 10 mm long.

[2] The minimal natural frequency values refer to maximum loads.

Tolerance reference dimension see drawing at www.schwingmetall.com

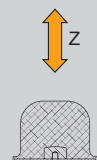■ made-to-order item

Directions of Loading

SCHWINGMETALL® Railstrips

Railstrips Type 2
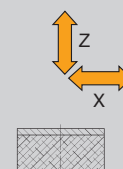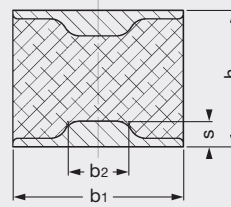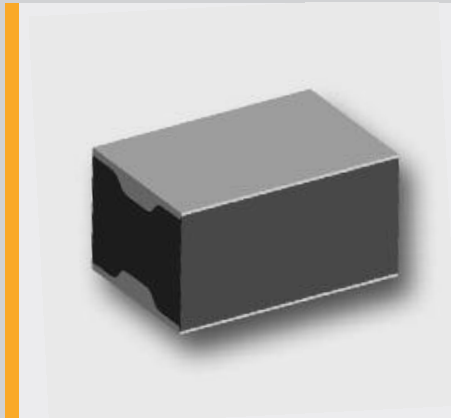
Dimensions					Spring Stiffness [1]		max. Loads [1]		Min. Natural Frequency [2]	Mass	Elas-tomer	Mould No.	Part No.
b_1 [mm]	b_2 [mm]	h [mm]	Length [mm]	s [mm]	$C_{x,y}$ [N/mm]	C_z [N/mm]	$F_{x,y}$ [N]	F_z [N]	ν_e min⁻¹	Piece [kg]	Hardness [Shore A]		
50	17	35	2000	10	18	131	100	250	685	13.90	55	25081b	3972204000
50	17	45	2000	10	11	72	100	250	506	14.99	55	25081a	3972205000
50	17	55	2000	10	7	48	100	250	414	16.09	55	25081	3972206000
50	17	60	2000	10	6	41	100	250	384	16.71	55	25080a	■
50	17	70	2000	10	4	31	100	250	333	17.80	55	25080	■
60	20	35	2000	11	25	240	120	300	847	17.64	55	25320	■
60	20	60	2000	11	9	58	120	300	418	20.99	55	25213a	■
70	20	30	2000	12	42	801	140	350	1434	19.84	55	20300	3972213000
70	20	45	2000	12	19	152	140	350	624	22.13	55	25082a	3972215000
70	20	55	2000	12	13	88	140	350	476	23.66	55	25082	3972216000
70	20	80	2000	12	6	44	140	350	335	27.62	55	25321	■
100	20	45	2000	12	31	432	200	500	879	33.30	55	20299	3972222000
100	20	55	2000	15	22	221	200	500	629	35.63	55	25079b	■
100	20	60	2000	15	19	163	200	500	540	36.60	55	25079	3972224000
100	20	70	2000	15	16	117	200	500	458	38.97	55	24472a	■
100	20	80	2000	15	11	80	200	500	377	40.96	55	24472	3972227000

[1] The indicated stiffness and maximum loads refer to a railstrip 10 mm long.

[2] The minimal natural frequency values refer to maximum loads.

Tolerance reference dimension see drawing at www.schwingmetall.com

■ made-to-order item

Directions of Loading
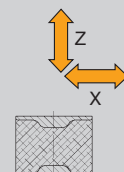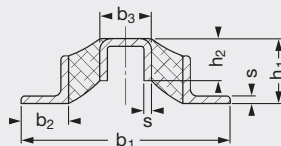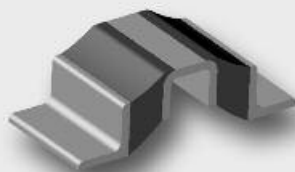
Railstrips U-Shaped

Dimensions							Spring Stiffness [1]		max. Loads [1]		Min. Natural Frequency [2]	Mass	Elas-tomer	Mould No.	Part No.
b1 [mm]	b2 [mm]	b3 [mm]	h1 [mm]	h2 [mm]	Length [mm]	s [mm]	C_x [N/mm]	$C_{y,z}$ [N/mm]	F_x [N]	$F_{y,z}$ [N]	ν_e min⁻¹	Piece [kg]	Hardness [Shore A]		
110	25	27	34	22	2000	4	42	14	80	42	604	11.64	40	20302	3966404000
110	25	27	34	22	2000	4	65	25	130	65	588	11.64	55	20302	3966204000
110	25	27	34	22	2000	4	118	38	160	118	581	11.64	65	20302	3966104000

[1] The indicated stiffness and maximum loads refer to a railstrip 10 mm long.

[2] The minimal natural frequency values refer to maximum loads.

Directions of Loading

Z

X
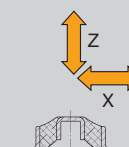
SCHWINGMETALL® Impact Mounts
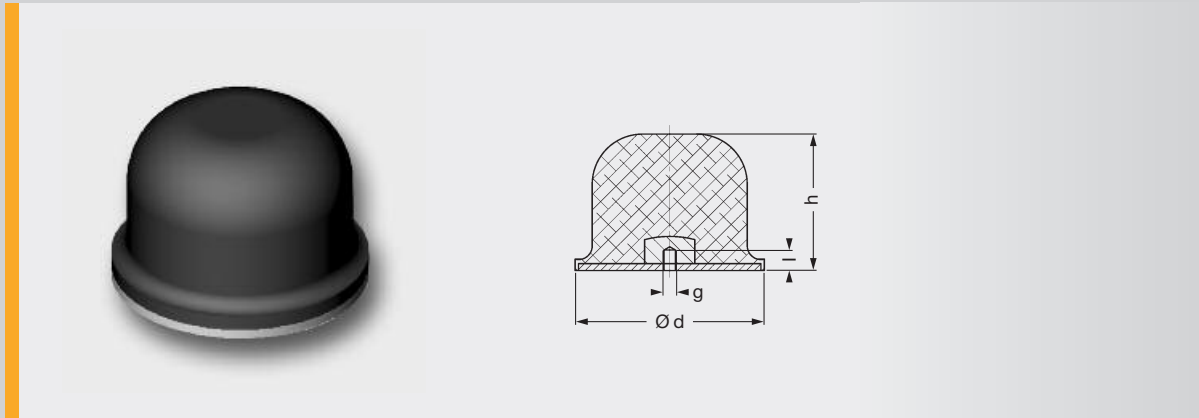
Impact Mounts with Internal Thread									
Dimensions				Max. Loads		Mass	Elas-tomer Hardness	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	F_z [N]	W [N/mm]	Piece [kg]	[Shore A]		
52	35	8.8	M10	3874	23.000	0.085	55	38652	3915250000
83	60	11.6	M12	11572	120.000	0.340	55	38653	3915251000
125	90	17.5	M16	29148	380.000	1.200	55	38654	3915252000

Direction of Loading

z

Force and Energy Direction Diagrams

Mould No. 38652

Impact Force F [kN] / Impact Energy W [Nm] vs Spring Travel s [mm]

55 Shore A

Mould No. 38653

Impact Force F [kN] / Impact Energy W [Nm] vs Spring Travel s [mm]

55 Shore A

Mould No. 38654

Impact Force F [kN] / Impact Energy W [Nm] vs Spring Travel s [mm]

55 Shore A

Buffers
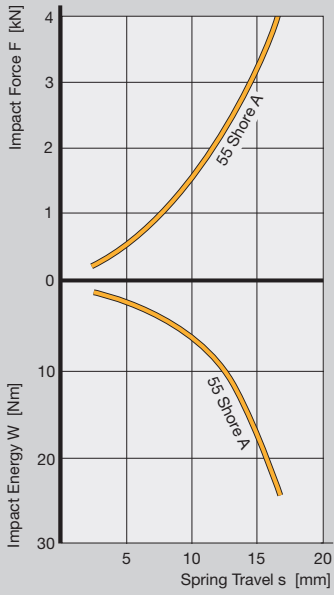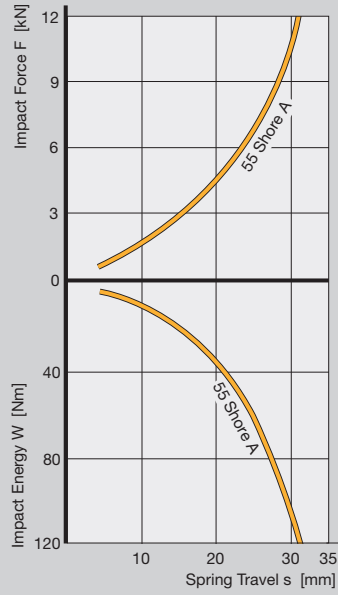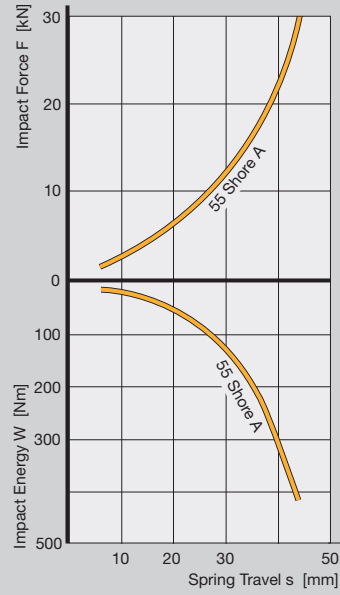
SCHWINGMETALL® Impact Mounts
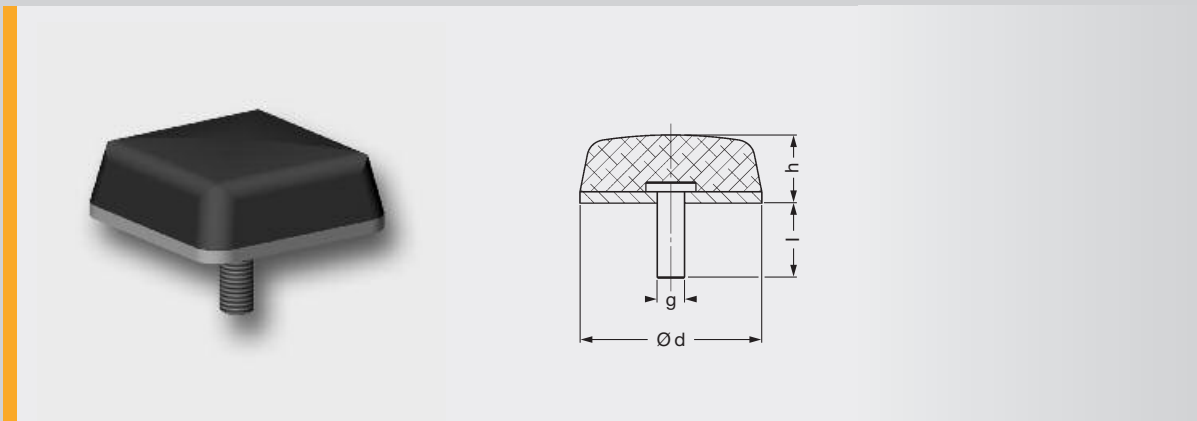
Impact Mounts with Outside Thread

Dimensions				Max. Loads		Mass	Elas-tomer Hardness	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	F_z [N]	W [N/mm]	Piece [kg]	[Shore A]		
25	16.5	18.5	M6	991	3.2	0.015	40	25444	■
25	16.5	18.5	M6	953	2.5	0.015	55	25444	3915209000
25	16.5	18.5	M6	1173	2.2	0.015	65	25444	■
50	17.0	28.0	M10	3586	5.4	0.077	40	25481	■
50	17.0	28.0	M10	3909	5.5	0.077	55	25481	3915216000
50	17.0	28.0	M10	3918	4.5	0.077	65	25481	■
□ 80	30.0	35.0	M12	19563	83	0.419	40	25443	■
□ 80	30.0	35.0	M12	20608	64	0.419	55	25443	3915223000
□ 80	30.0	35.0	M12	20206	49	0.419	65	25443	■
125	45.0	43.0	M16	49143	320	0.920	55	38655	3915223000

■ made-to-order item

Direction of Loading

Z
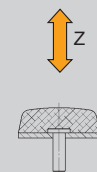
Force and Energy Direction Diagrams

Mould No. 25444
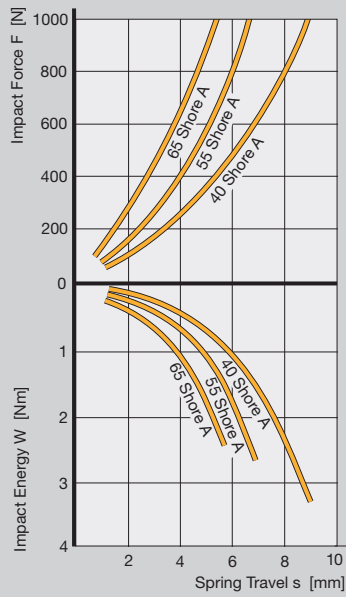
Mould No. 25481
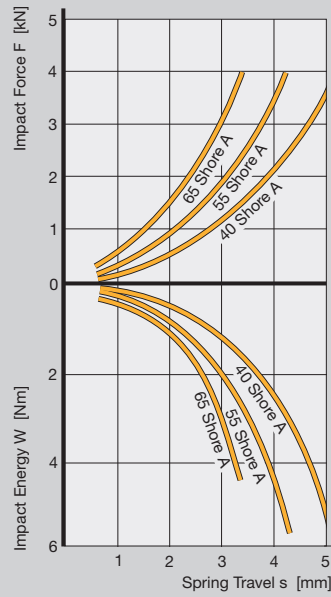
Mould No. 25443

Mould No. 38655

Buffers
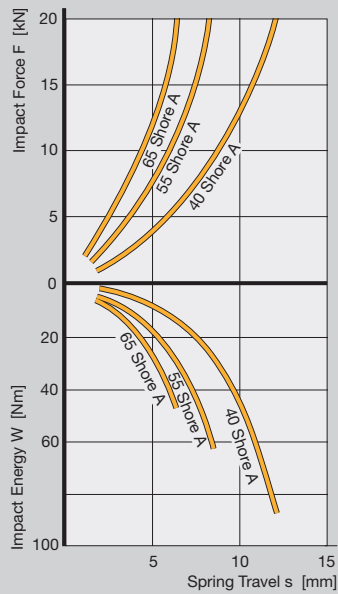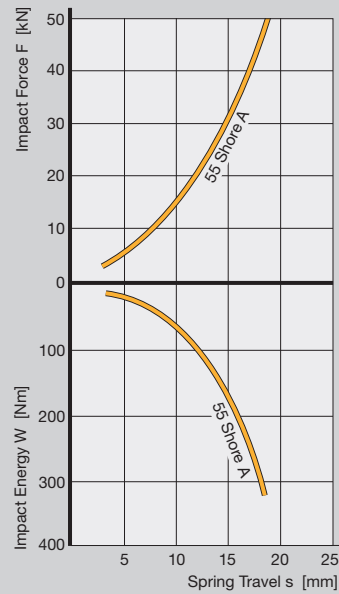
SCHWINGMETALL® Heavy-Duty Impact Mounts
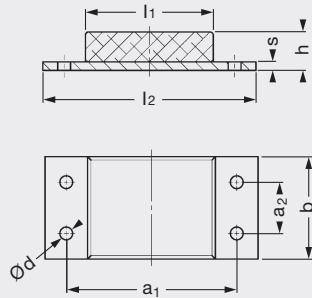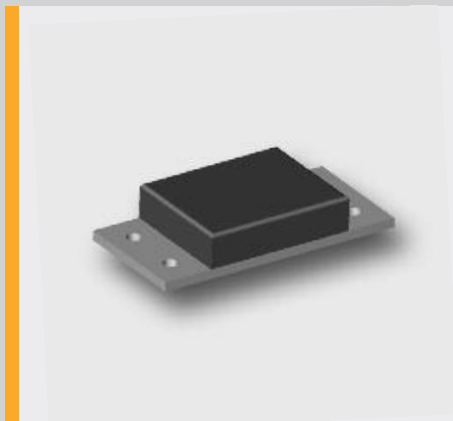
Heavy-Duty Impact Mounts

Dimensions								Max. Loads		Mass	Elas-tomer	Mould No.	Part No.
a1 [mm]	a2 [mm]	b [mm]	d [mm]	h [mm]	l1 [mm]	l2 [mm]	s [mm]	F_z [N]	W [N/mm]	Piece [kg]	Hardness [Shore A]		
100	1)	50	2 x 8.5	35	70	130	5	10100	40	0.360	55	25081b/AN	3973501000
100	1)	50	2 x 8.5	70	70	130	5	9614	89	0.500	55	25080/AN	3973502000
160	50	100	4 x 13	45	120	200	10	36256	175	1.935	55	20299/AN	3974505000
160	50	100	4 x 13	80	120	200	10	35758	420	2.430	55	24472/AN	3974506000
200	60	120	4 x 15	45	150	250	10	58491	250	2.900	55	21422b/AN	3974507000
200	60	120	4 x 15	70	150	250	10	58654	497	3.470	55	21422/AN	3974508000
250	80	150	4 x 17	50	200	300	15	97971	330	6.150	55	21055b/AN	3975509000
250	80	150	4 x 17	80	200	300	15	99552	950	7.250	55	21055/AN	3975510000

1) a2 without value means only one hole bored in the center.

Direction of Loading
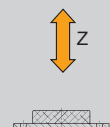
Force and Energy Direction Diagrams

Mould No. 25081b/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [Nm] — 55 Shore A
Spring Travel s [mm]

Mould No. 25080/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [Nm] — 55 Shore A
Spring Travel s [mm]

Mould No. 20299/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [Nm] — 55 Shore A
Spring Travel s [mm]

Mould No. 24472/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [Nm] — 55 Shore A
Spring Travel s [mm]

Mould No. 21422b/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [kN] — 55 Shore A
Spring Travel s [mm]

Mould No. 21422/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [kN] — 55 Shore A
Spring Travel s [mm]

Mould No. 21055b/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [Nm] — 55 Shore A
Spring Travel s [mm]

Mould No. 21055/AN

Impact Force F [kN] — 55 Shore A
Impact Energy W [kN] — 55 Shore A
Spring Travel s [mm]

SCHWINGMETALL® Impact Mounts

Parabolic spring									
Dimensions				Max. Loads		Mass	Elas-tomer Hardness	Mould No.	Part No.
d [mm]	h [mm]	l [mm]	g	F_z [N]	W [N/mm]	Piece [kg]	[Shore A]		
21	24	19.0	M6	529	2.4	0.011	55	58496	3915236000
32	36	20.5	M8	1398	8.0	0.032	55	58495	3915235000
52	58	28.0	M10	3863	37.0	0.110	55	58497	3915237000
75	89	37.0	M12	8524	120.0	0.345	55	58498	3915238000
115	136	43.0	M16	17122	412.0	1.200	55	58102	3915234000
165	195	43.0	M16	36228	1200.0	3.000	55	58499	3915239000

Direction of Loading

Force and Energy Direction Diagrams

Mould No. 58496

Impact Force F [N]
600
500
400
300
200
100
0

55 Shore A

Impact Energy W [Nm]
0
1
2
3
4

55 Shore A

Spring Travel s [mm]
2 4 6 8 10 12 14

Mould No. 58495

Impact Force F [N]
1400
1200
1000
800
600
400
200
0

55 Shore A

Impact Energy W [Nm]
0
2
4
6
8
10
12
14

55 Shore A

Spring Travel s [mm]
2 6 10 14 20

Mould No. 58497

Impact Force F [kN]
4
2
1
0

55 Shore A

Impact Energy W [Nm]
0
20
40
60

55 Shore A

Spring Travel s [mm]
5 10 15 20 25 30 35

Mould No. 58498

Impact Force F [kN]
9
8
6
4
2
0

55 Shore A

Impact Energy W [Nm]
0
50
100
150
200

55 Shore A

Spring Travel s [mm]
10 20 30 40 50

Mould No. 58102

Impact Force F [kN]
20
16
12
8
4
0

55 Shore A

Impact Energy W [Nm]
0
200
400
600
700

55 Shore A

Spring Travel s [mm]
20 40 60 80

Mould No. 58499

Impact Force F [kN]
45
40
30
20
10
0

55 Shore A

Impact Energy W [Nm]
0
500
1000
1500
2000

55 Shore A

Spring Travel s [mm]
20 40 60 80 110

35

SCHWINGMETALL® Cone Mounts

Mould No. 210356

Mould No. 210355

Cone Mounts									
Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
1000	480	180	2100	1010	650	0.47	40	210356	4000004934
1700	1010	320	3400	2020	1120	0.47	55	210356	4000004935
2500	1500	460	4750	2850	1560	0.47	65	210356	4000004936
1150	1150	270	2420	2420	970	0.48	40	210355	4000004931
2000	2000	490	4000	4000	1720	0.48	55	210355	4000004932
2700	2700	670	5130	5130	2280	0.48	65	210355	4000004933
340	640	160	1360	2560	740	0.55	40	210352	4000004925
570	1050	270	2220	4100	1220	0.55	55	210352	4000004926
900	1650	380	3420	6270	1670	0.55	65	210352	4000004927
580	760	200	2320	3040	920	0.75	40	210352A	4000004928
970	1190	340	3780	4640	1530	0.75	55	210352A	4000004929
1350	1790	470	5130	6800	2070	0.75	65	210352A	4000004930
770	770	240	3080	3080	1100	0.57	40	210089	4000004922
1260	1260	400	4910	4910	1800	0.57	55	210089	4000004923
2000	2000	580	7600	7600	2550	0.57	65	210089	4000004924
1140	1140	390	5700	5700	1800	1.10	40	210444	4000004937
1680	1680	670	7970	7970	3000	1.10	55	210444	4000004938
2240	2240	970	10080	10080	4400	1.10	65	210444	4000004939
1040	1040	440	4000	4000	1200	2.10	55	210470	4000004940
1600	1600	710	6400	6400	1900	2.10	65	210470	4000004941
2470	2470	1170	8000	8000	3000	2.10	75	210470	4000004942
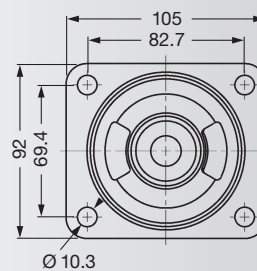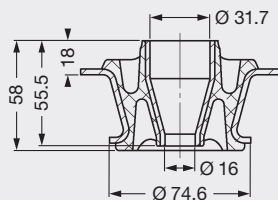
Mould No. 210352
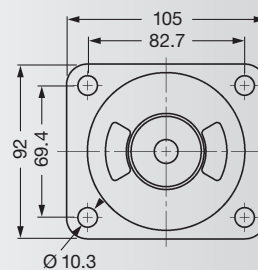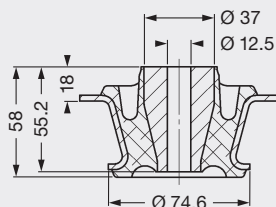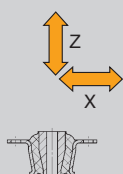

Mould No. 210352A

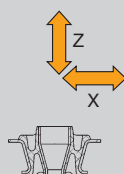Mould No. 210089
Mould No. 210444
Mould No. 210470

Cone Mounts

Directions of Loading
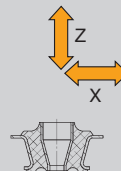
Z

X

Directions of Loading

Z

X

Directions of Loading

Z

X

Directions of Loading

Z

X

SCHWINGMETALL® Cone Mounts

Ø 36.7
Ø 31.7
18
58
55.5
Ø 16
Ø 74.6

105
82.7
92
69.4
Ø 10.3

Mould No. 210089
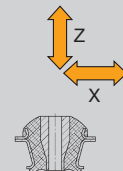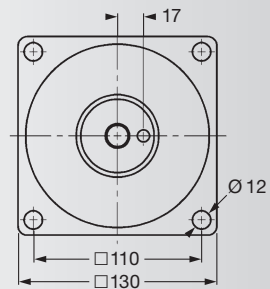

Ø 38
Ø 17
33
74
71
Ø 74.6

105
82.7
92
69.4
Ø 10.3

Mould No. 210444

◄ see page 36 for cone mount table

Directions of Loading

Z
X

Directions of Loading

Z
X

Ø 48
M 16
Ø 8

20

86
77

10

Ø 103

17

Ø 12

□ 110
□ 130
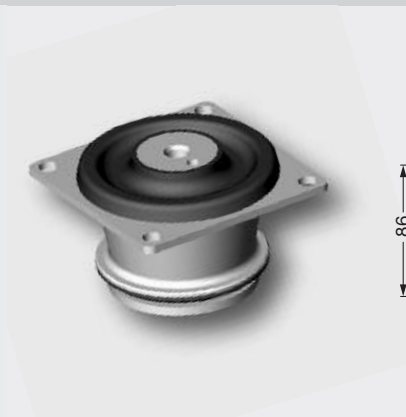
Mould No. 210470

Directions of Loading
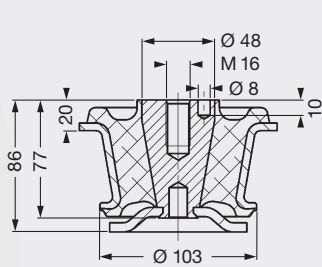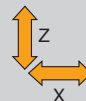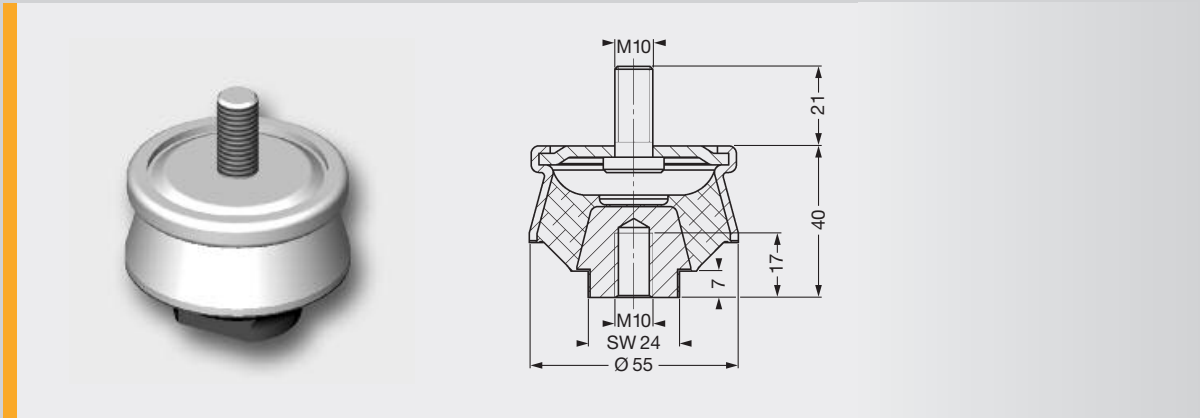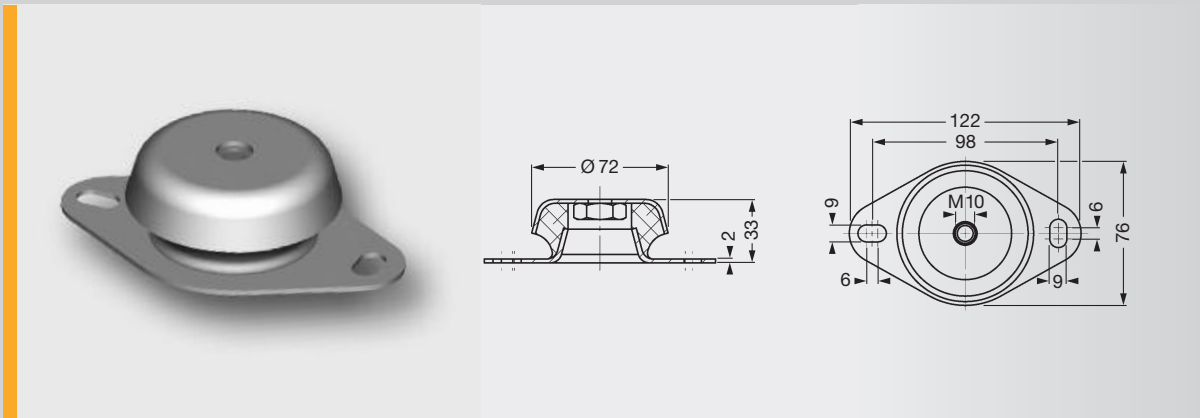
Z

X

SCHWINGMETALL® Dome Mounts

Mould No. 104169

Mould No. 103965

Dome Mounts

| a [mm]	b [mm]	d1 [mm]	d2 [mm]	e [mm]	g [mm]	h [mm]	s1 [mm]	s2 [mm]	s3 [mm]	Washer DIN 9021-ST
Dimensions										
□ 88	□ 108	101	4 x 9	SW8	M12	40	3	2.5	5	A13x3
□ 88	□ 108	101	4 x 9	SW8	M12	40	3	2.5	5	A13x3
□ 88	□ 108	101	4 x 9	SW8	M12	40	3	2.5	5	A13x3
□ 132	□ 168	136	4 x 13	SW10	M16	50	4	3.0	6	A17x3
□ 132	□ 168	136	4 x 13	SW10	M16	50	4	3.0	6	A17x3
□ 132	□ 168	136	4 x 13	SW10	M16	50	4	3.0	6	A17x3
□ 165	□ 200	192	4 x 13	SW14	M20	70	6	4.0	6	A21x4
□ 165	□ 200	192	4 x 13	SW14	M20	70	6	4.0	6	A21x4
□ 165	□ 200	192	4 x 13	SW14	M20	70	6	4.0	6	A21x4

▶ **Wet the studs with soapy water before mounting the underlay.**

▶ **Nuts according to DIN 555, washers according to DIN 25 and spring washers according to DIN 127 are commercial parts.**
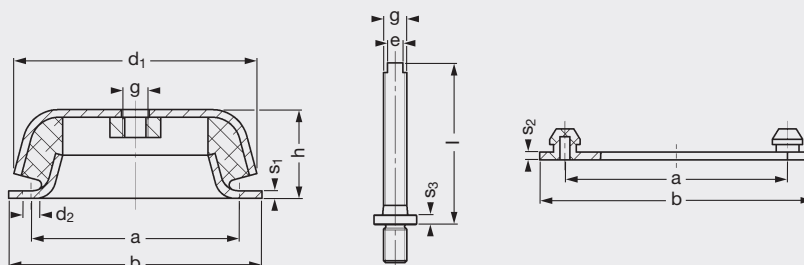
Directions of Loading
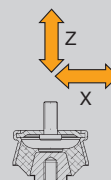
Directions of Loading
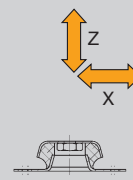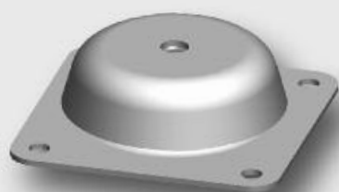
Mould No. 58540, 33629, 58541

Mould No. 58540, 33629, 58541

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.	Part No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		Mount	Level Adjustment Spindle	Washer Mat
221	221	110	200	200	400	0.248	40	104169	3956412001		
437	437	200	410	410	687	0.248	55	104169	3956212001		
730	730	316	650	650	1080	0.248	65	104169	3956112001		
180	180	405	300	300	1965	0.238	40	103965	3956410000		
320	320	605	480	480	2450	0.238	55	103965	3956210000		
460	460	981	690	690	2950	0.238	65	103965	3956110000		
410	410	505	900	900	1965	0.650	40	58540	3956406000	3956026000	3956016000
746	746	910	1650	1650	3500	0.650	55	58540	3956206000	3956026000	3956016000
1180	1180	1315	2600	2660	4950	0.650	65	58540	3956106000	3956026000	3956016000
850	850	920	1750	1750	4000	1.770	40	33629	3956405000	3956025000	3956015000
1540	1540	1650	3300	3300	6900	1.770	55	33629	3956205000	3956025000	3956015000
2400	2400	2555	5000	5000	9850	1.770	65	33629	3956105000	3956025000	3956015000
1400	1400	1390	4200	4200	7900	4.215	40	58541	3956407000	3956027000	3956017000
2400	2400	2250	7000	7000	12000	4.215	55	58541	3956207000	3956027000	3956017000
3450	3450	3400	10350	10350	19700	4.215	65	58541	3956107000	3956027000	3956017000

Directions of Loading

Z

X
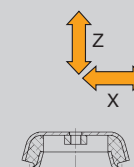
SCHWINGMETALL® Dome Mounts
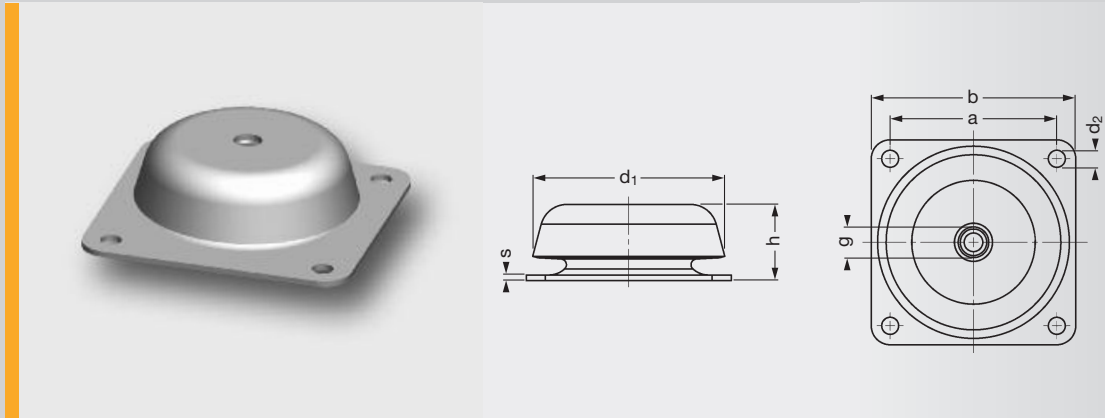
Dome Mounts AS Series

Dimensions						
a [mm]	b [mm]	d1 [mm]	d2 [mm]	g [mm]	h [mm]	s [mm]
□ 88	□ 108	101	4 x 9	M12	40	3
□ 88	□ 108	101	4 x 9	M12	40	3
□ 88	□ 108	101	4 x 9	M12	40	3
□ 132	□ 168	136	4 x 13	M16	50	4
□ 132	□ 168	136	4 x 13	M16	50	4
□ 132	□ 168	136	4 x 13	M16	50	4

▶ **Mount with integrated stop disk**

Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
410	410	505	900	900	1965	0.65	40	210642	4000005311
746	746	910	1650	1650	3500	0.65	55	210642	4000005312
1180	1180	1315	2600	2660	4950	0.65	65	210642	4000005313
850	850	920	1750	1750	4000	1.77	40	210643	4000005314
1540	1540	1650	3300	3300	6900	1.77	55	210643	4000005315
2400	2400	2555	5000	5000	9850	1.77	65	210643	4000005316

Resp. Underlays and Level Adjustment Spindles

Dome Mounts

Directions of Loading

Z

X
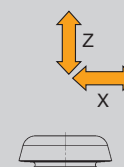
SCHWINGMETALL® Dome Mounts
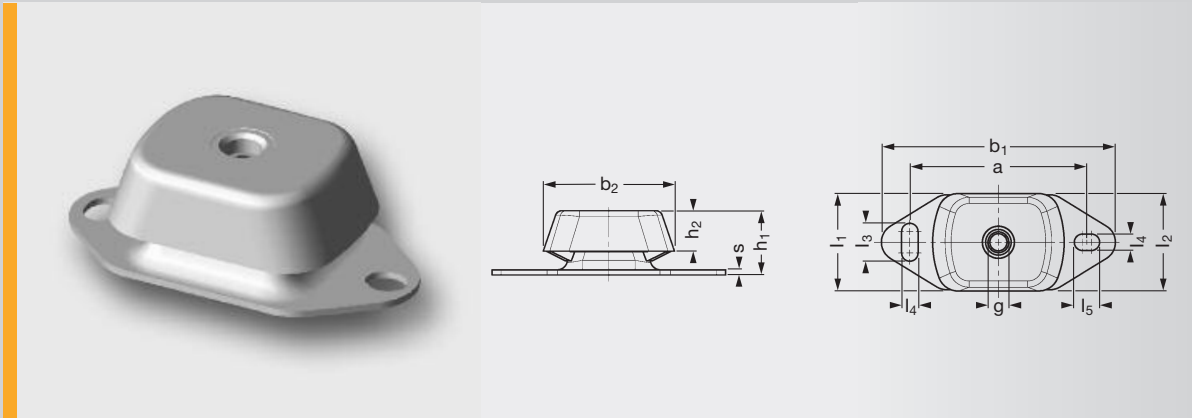
Dome Mounts C Series

Dimensions											
a [mm]	b₁ [mm]	b₂ [mm]	g [mm]	h₁ [mm]	h₂ [mm]	l₁ [mm]	l₂ [mm]	l₃ [mm]	l₄ [mm]	l₅ [mm]	s [mm]
100	120	80.0	M12	39	24.0	60	60	14	11	14	2.5
100	120	80.0	M12	39	24.0	60	60	14	11	14	2.5
100	120	80.0	M12	39	24.0	60	60	14	11	14	2.5
140	185	104.0	M16	50	31.5	75	77	30	13	20	4.0
140	185	104.0	M16	50	31.5	75	77	30	13	20	4.0
140	185	104.0	M16	50	31.5	75	77	30	13	20	4.0
182	228	131.5	M20	70	50.0	114	114	34	18	26	5.0
182	228	131.5	M20	70	50.0	114	114	34	18	26	5.0
182	228	131.5	M20	70	50.0	114	114	34	18	26	5.0

▶ **Mount with integrated stop disk**

Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
250	180	90	290	90	300	0.40	45	210620	4000004903
320	210	120	310	120	400	0.40	55	210620	4000004904
480	330	170	500	180	600	0.40	65	210620	4000004905
430	120	220	780	140	1100	0.95	45	210621	4000004906
680	240	320	1200	160	1600	0.95	55	210621	4000004907
800	530	445	1500	260	2200	0.95	65	210621	4000004908
940	370	620	2700	380	3600	2.25	45	210622	4000004909
1100	630	820	3300	680	5000	2.25	55	210622	4000004920
1250	810	1150	3800	800	5900	2.25	65	210622	4000004921

Resp. Level Adjustment Spindles

Directions of Loading

Z

X
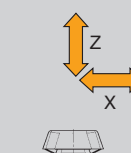
SCHWINGMETALL® Flange Mounts
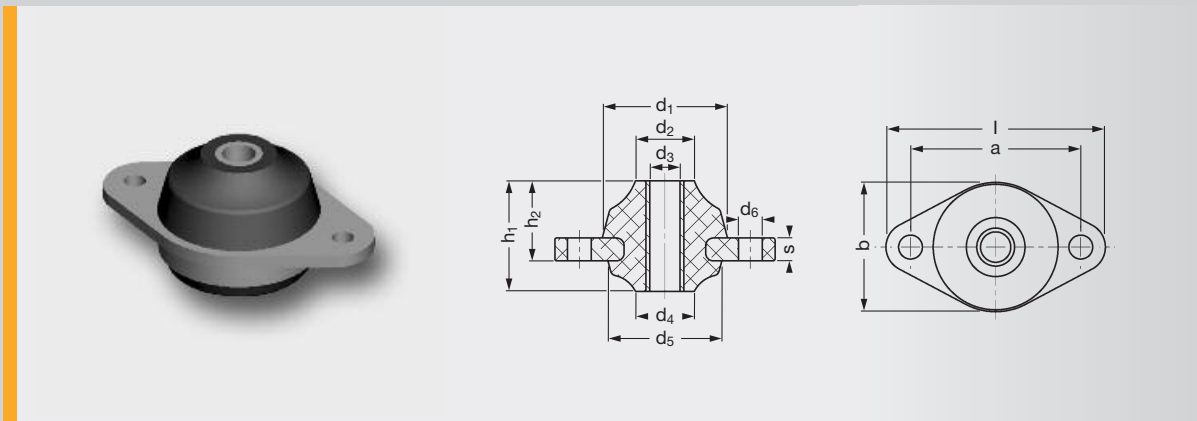
Flange Mounts

						Dimensions					
a [mm]	b [mm]	d_1 [mm]	d_2 [mm]	d_3 [mm]	d_4 [mm]	d_5 [mm]	d_6 [mm]	h_1 [mm]	h_2 [mm]	l [mm]	s [mm]
45	34	33	15.5	8	15.5	——	6.3	29	21	58	6[1]
70	48	47	23.0	12	22	——	9	40	28	90	8[1]
94	71	68	33.0	16	37	65	9	54	33	117	5
94	71	68	39.0	16	37	65	9	49	28	117	5
94	71	68	52.0	16	48	65	9	44	21	117	5
114	90	82	40.0	20	42	80	13	68	40	150	6
114	90	82	49.0	20	42	80	13	62	34	150	6
114	90	82	60.0	20	53	80	13	51	23	150	6
138	108	96	45.0	20	47	95	13	82	46	174	8
138	108	96	58.0	20	47	95	13	76	40	174	8
138	108	96	62.0	20	63	95	13	68	29	174	8

[1] plastic flange
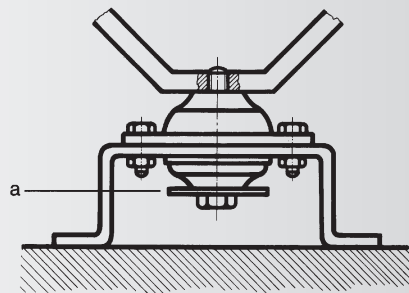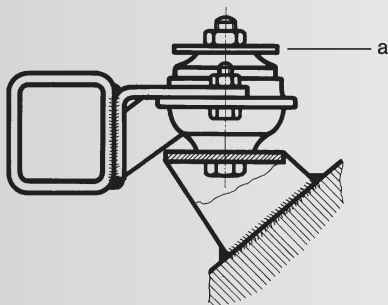
Installation Example – The static load affects the higher spring part in both cases.

▶ **Installation Instruction**
The disks "a" depicted in both installation examples are required for correct function, but are not included in the scope of supply. The diameter of the disks must not be less than d_1 -5 mm.

Spring Stiffness		Max. Loads		Max. Impact Load [2]		Mass	Elas-tomer Hardness	Mould No.	Part No.
$C_{x,y}$ [N/mm]	C_z [N/mm]	$F_{x,y}$ [N]	F_z [N]	$F_{impact\ load\ X,Y}$ [N]	$F_{impact\ load\ z}$ [N]	Piece [kg]	[Shore A]		
153	83	160	600	400	+700 / -1500 [3]	0.026	45	48684	■
237	125	280	700	400	+1500 / -2000 [3]	0.080	45	48685	■
227	140	720	1200	1800	+2500 / -5000	0.395	45	48686	■
273	245	720	1200	1800	+2500 / -5000	0.384	45	48687	■
307	356	720	1200	1800	+2500 / -5000	0.380	45	48688	■
290	158	1120	1800	2800	+5000 / -7500	0.785	45	48689	■
410	280	1120	1800	2800	+5000 / -7500	0.768	45	48690	■
550	435	1120	1800	2800	+5000 / -7500	0.730	45	48691	■
456	228	1800	2400	4500	+7500 / -10000	1.570	45	48692	■
460	247	1800	2400	4500	+7500 / -10000	1.540	45	48693	■
559	380	1800	2400	4500	+7500 / -10000	1.490	45	48694	■

[2] Maximum impact load at nominal load.

[3] During impact load procedure, the plastic flanges must be well reinforced.

■ made-to-order item

Flange Mounts

Directions of Loading
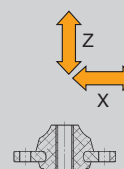
SCHWINGMETALL® Flange Mounts
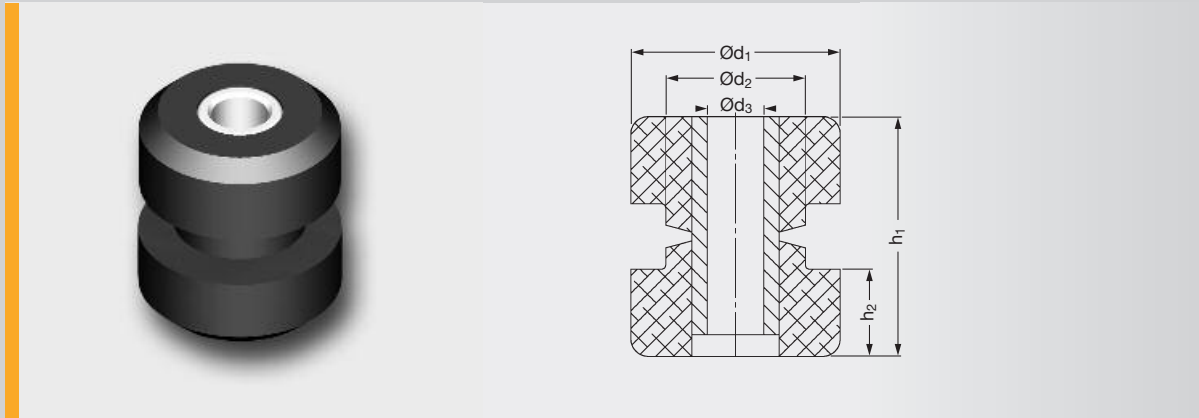
Flange Mounts B Series										
Dimensions										
d_1 [mm]	d_2 [mm]	d_3 [mm]	d_4 [mm]	d_5 [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	s [mm]	r [mm]	g
48	32	13	min. 55	31	53	20	50	15	1.5	M12
48	32	13	min. 55	31	53	20	50	15	1.5	M12
48	32	13	min. 55	31	53	20	50	15	1.5	M12
64	40	17	min. 70	39	65	23	62	22	2.3	M16
64	40	17	min. 70	39	65	23	62	22	2.3	M16
64	40	17	min. 70	39	65	23	62	22	2.3	M16
88	57	24	min. 95	56	76	25	73	28	3	M20
88	57	24	min. 95	56	76	25	73	28	3	M20
88	57	24	min. 95	56	76	25	73	28	3	M20
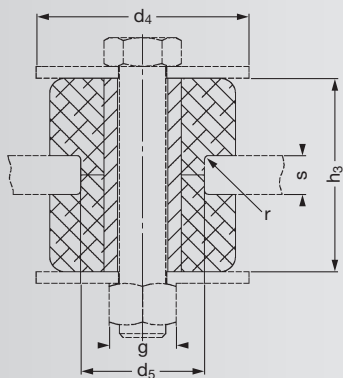
Spring Stiffness		Max. Loads	Mass	Elastomer	Mould No.	Part No.
$C_{x,y}$ [N/mm]	C_z [N/mm]	F_z [N]	Piece [kg]	Hardness [Shore A]		
260	410	400	0.150	40	210670	4000005278
380	670	900	0.150	55	210670	4000005279
540	950	1200	0.150	65	210670	4000005301
330	670	1300	0.275	40	210671	4000005302
500	1060	2100	0.275	55	210671	4000005303
690	1370	2900	0.275	65	210671	4000005304
410	1050	1700	0.600	40	210672	4000005305
720	1760	3400	0.600	55	210672	4000005306
1000	2320	4600	0.600	65	210672	4000005307

Flange Mounts

Directions of Loading
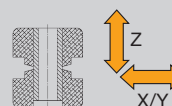
SCHWINGMETALL® Angled Mounts
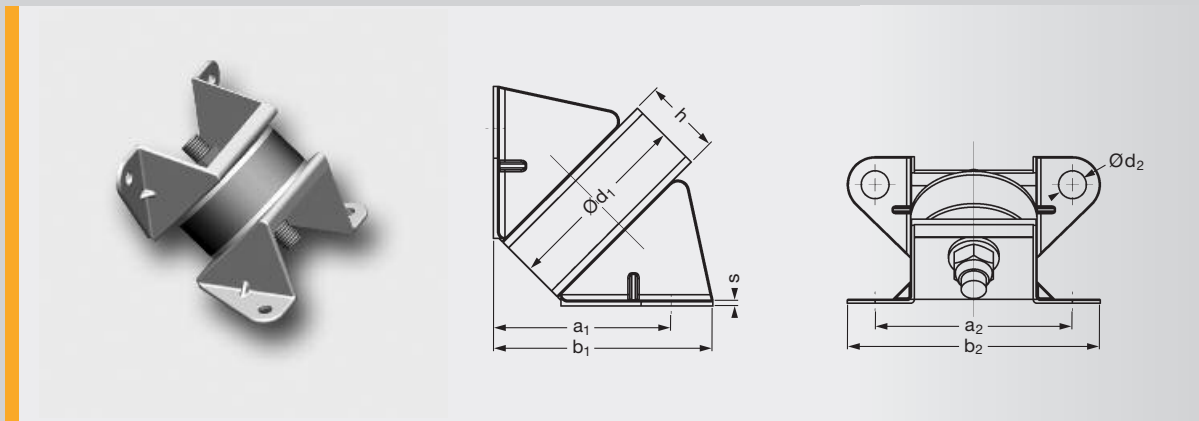
Combi Mounts L with Compression Mounts

Dimensions							
a1 [mm]	a2 [mm]	b1 [mm]	b2 [mm]	d1 [mm]	d2 [mm]	h [mm]	s [mm]
47	78	58	100	50	11	20	1.5
47	78	58	100	50	11	20	1.5
47	78	58	100	50	11	20	1.5
54	78	65	100	50	11	30	1.5
54	78	65	100	50	11	30	1.5
54	78	65	100	50	11	30	1.5
64	78	75	100	50	11	45	1.5
64	78	75	100	50	11	45	1.5
64	78	75	100	50	11	45	1.5
79	100	91	124	70	11	35	2.5
79	100	91	124	70	11	35	2.5
79	100	91	124	70	11	35	2.5
86	100	98	124	70	11	45	2.5
86	100	98	124	70	11	45	2.5
86	100	98	124	70	11	45	2.5
96	100	108	124	70	11	60	2.5
96	100	108	124	70	11	60	2.5
96	100	108	124	70	11	60	2.5
102	140	117	170	100	11	40	3.5
102	140	117	170	100	11	40	3.5
102	140	117	170	100	11	40	3.5
112	140	127	170	100	11	55	3.5
112	140	127	170	100	11	55	3.5
112	140	127	170	100	11	55	3.5
126	140	141	170	100	11	75	3.5
126	140	141	170	100	11	75	3.5
126	140	141	170	100	11	75	3.5

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
60	266	266	400	1000	1000	0.268	40	25332/A	■
110	481	481	420	1250	1250	0.268	55	25332/A	■
170	740	740	440	1500	1500	0.268	65	25332/A	■
34	120	120	400	1000	1000	0.293	40	25333/A	■
62	218	218	420	1200	1200	0.293	55	25333/A	■
95	335	335	440	1400	1400	0.293	65	25333/A	■
20	67	67	392	1000	1000	0.328	40	27797/A	■
35	122	122	410	1200	1200	0.328	55	27797/A	■
54	188	188	430	1400	1400	0.328	65	27797/A	■
69	244	244	750	1850	1850	0.712	40	20290a/A	■
127	442	442	790	2200	2200	0.712	55	20290a/A	■
198	680	680	830	2550	2550	0.712	65	20290a/A	■
47	155	155	750	1850	1850	0.754	40	20290/A	■
86	281	281	790	2150	2150	0.754	55	20290/A	■
133	433	433	830	2350	2350	0.754	65	20290/A	■
31	98	98	750	1850	1850	0.817	40	20290b/A	■
56	177	177	790	2150	2150	0.817	55	20290b/A	■
86	272	272	830	2350	2350	0.817	65	20290b/A	■
130	577	577	1500	3900	3900	1.958	40	25334/A	■
241	1044	1044	1600	4500	4500	1.958	55	25334/A	■
375	1606	1606	1700	5000	5000	1.958	65	25334/A	■
73	265	265	1500	3900	3900	2.128	40	25335/A	■
132	480	480	1600	4300	4300	2.128	55	25335/A	■
204	738	738	1700	4800	4800	2.128	65	25335/A	■
53	179	179	1500	3900	3900	2.301	40	25328/A	■
96	324	324	1600	4100	4100	2.301	55	25328/A	■
149	498	498	1700	4300	4300	2.301	65	25328/A	■

■ made-to-order item

Angled Mounts

Directions of Loading

Z
Y
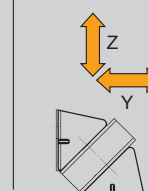
SCHWINGMETALL® Angled Mounts
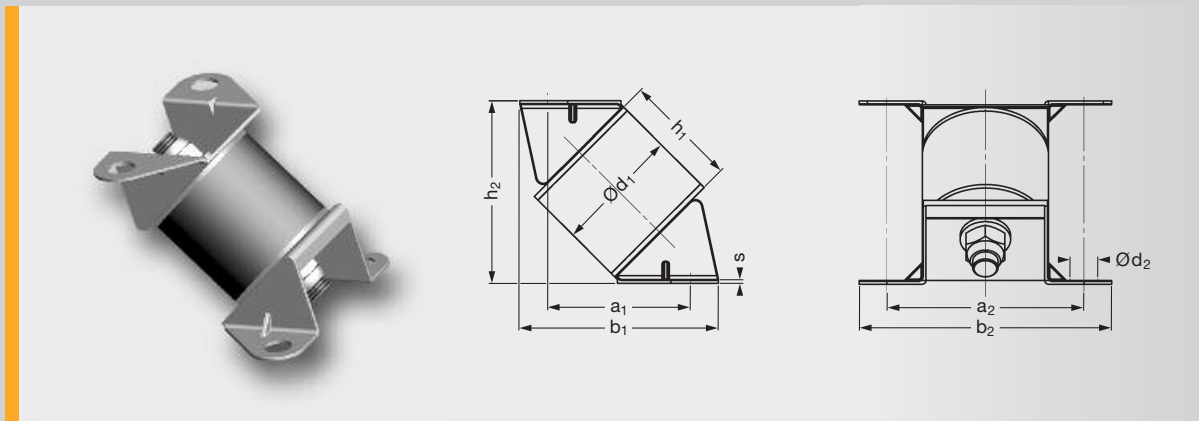
Combi Mounts Z with Compression Mounts

				Dimensions				
a1 [mm]	a2 [mm]	b1 [mm]	b2 [mm]	d1 [mm]	d2 [mm]	h1 [mm]	h2 [mm]	s [mm]
39	78	61	100	50	11	20	55	1.5
39	78	61	100	50	11	20	55	1.5
39	78	61	100	50	11	20	55	1.5
46	78	68	100	50	11	30	62	1.5
46	78	68	100	50	11	30	62	1.5
46	78	68	100	50	11	30	62	1.5
57	78	79	100	50	11	45	72	1.5
57	78	79	100	50	11	45	72	1.5
57	78	79	100	50	11	45	72	1.5
75	100	99	124	70	11	35	83	2.5
75	100	99	124	70	11	35	83	2.5
75	100	99	124	70	11	35	83	2.5
82	100	106	124	70	11	45	90	2.5
82	100	106	124	70	11	45	90	2.5
82	100	106	124	70	11	45	90	2.5
92	100	116	124	70	11	60	100	2.5
92	100	116	124	70	11	60	100	2.5
92	100	116	124	70	11	60	100	2.5
93	140	123	170	100	11	40	111	3.5
93	140	123	170	100	11	40	111	3.5
93	140	123	170	100	11	40	111	3.5
103	140	133	170	100	11	55	122	3.5
103	140	133	170	100	11	55	122	3.5
103	140	133	170	100	11	55	122	3.5
117	140	147	170	100	11	75	136	3.5
117	140	147	170	100	11	75	136	3.5
117	140	147	170	100	11	75	136	3.5

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
60	266	266	400	1000	1000	0.268	40	25332/A	■
110	481	481	420	1250	1250	0.268	55	25332/A	■
170	740	740	440	1500	1500	0.268	65	25332/A	■
34	120	120	400	1000	1000	0.293	40	25333/A	3911618000
62	218	218	420	1200	1200	0.293	55	25333/A	3911518000
95	335	335	440	1400	1400	0.293	65	25333/A	■
20	67	67	392	1000	1000	0.328	40	27797/A	3911619000
35	122	122	410	1200	1200	0.328	55	27797/A	3911519000
54	188	188	430	1400	1400	0.328	65	27797/A	■
69	244	244	750	1850	1850	0.712	40	20290a/A	■
127	442	442	790	2200	2200	0.712	55	20290a/A	■
198	680	680	830	2550	2550	0.712	65	20290a/A	■
47	155	155	750	1850	1850	0.754	40	20290/A	3911620000
86	281	281	790	2150	2150	0.754	55	20290/A	3911520000
133	433	433	830	2350	2350	0.754	65	20290/A	■
31	98	98	750	1850	1850	0.817	40	20290b/A	3911642000
56	177	177	790	2150	2150	0.817	55	20290b/A	3911542000
86	272	272	830	2350	2350	0.817	65	20290b/A	■
130	577	577	1500	3900	3900	1.958	40	25334/A	■
241	1044	1044	1600	4500	4500	1.958	55	25334/A	■
375	1606	1606	1700	5000	5000	1.958	65	25334/A	■
73	265	265	1500	3900	3900	2.128	40	25335/A	3911625000
132	480	480	1600	4300	4300	2.128	55	25335/A	3911525000
204	738	738	1700	4800	4800	2.128	65	25335/A	■
53	179	179	1500	3900	3900	2.301	40	25328/A	3911646000
96	324	324	1600	4100	4100	2.301	55	25328/A	3911546000
149	498	498	1700	4300	4300	2.301	65	25328/A	■

■ made-to-order item

Angled Mounts

Directions of Loading

53
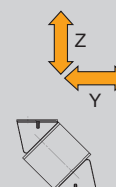
SCHWINGMETALL® Angled Mounts
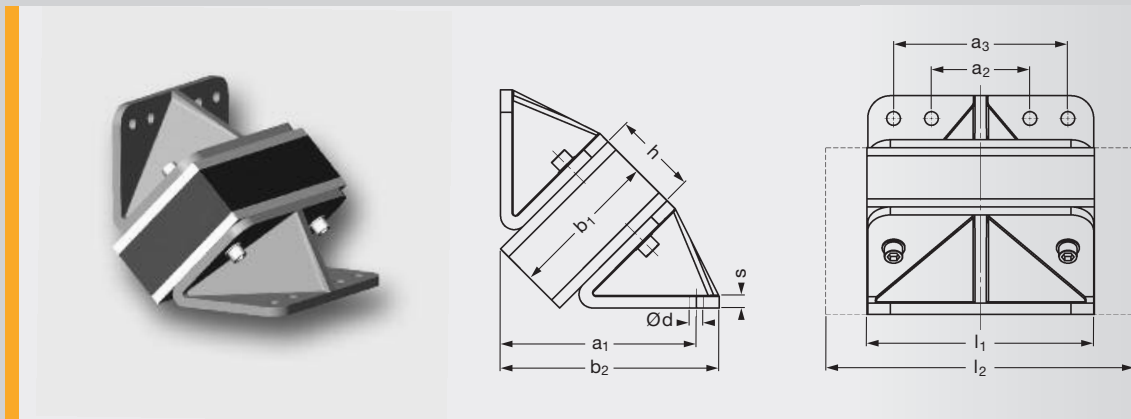
Combi Mounts L with Railstrip

Dimensions									
a1 [mm]	a2 [mm]	a3 [mm]	b1 [mm]	b2 [mm]	d [mm]	h [mm]	l1 [mm]	l2 [mm]	s [mm]
202	——	150	150	227	4 x 18	80	225	——	15
202	——	150	150	227	4 x 18	80	——	338	15
136	——	110	100	152	4 x 14	60	150	——	10
136	——	110	100	152	4 x 14	60	——	225	10
216	——	150	150	241	4 x 18	100	225	——	15
216	——	150	150	241	4 x 18	100	——	338	15
187	——	150	150	212	4 x 18	60	225	——	15
187	——	150	150	212	4 x 18	60	——	338	15
158	——	110	100	174	4 x 14	90	150	——	10
158	——	110	100	174	4 x 14	90	——	225	10
147	——	110	100	163	4 x 14	75	150	——	10
147	——	110	100	163	4 x 14	75	——	225	10
258	130	230	200	288	8 x 18	110	300	——	15
258	130	230	200	288	8 x 18	110	——	450	15
244	130	230	200	274	8 x 18	90	300	——	15
244	130	230	200	274	8 x 18	90	——	450	15
233	130	230	200	260	8 x 18	70	300	——	15
233	130	230	200	260	8 x 18	70	——	450	15

l1 short design   l2 long design

Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
640	3616	3616	6700	20000	20000	20.99	55	21055	■
960	5423	5423	10050	30000	30000	25.92	55	21055	■
480	2931	2931	3400	7500	7500	7.21	55	25079	■
720	4397	4397	5100	11250	11250	9.18	55	25079	■
437	1796	1796	6640	17000	17000	21.73	55	58394	■
656	2694	2694	6640	17000	17000	27.02	55	58394	■
768	9303	9303	6758	22000	22000	20.25	55	21055a	■
1152	13954	13954	10137	33000	33000	24.81	55	21055a	■
183	758	758	3000	7500	7500	7.70	55	24472c	■
275	1137	1137	4500	11250	11250	9.92	55	24472c	■
275	1191	1191	3400	7500	7500	7.46	55	24472d	■
413	1786	1786	5100	11250	11250	9.55	55	24472d	■
735	2917	2917	12100	30000	30000	41.40	55	38417a	■
1103	4376	4376	12100	30000	30000	51.80	55	38417a	■
981	4905	4905	12194	30000	30000	40.10	55	38417b	■
1472	7358	7358	18291	45000	45000	49.80	55	38417b	■
1468	11190	11190	11965	32500	32500	38.70	55	38417c	■
2202	16785	16785	17948	48750	48750	47.80	55	38417c	■

■ made-to-order item

Angled Mounts

Directions of Loading

Z

Y

SCHWINGMETALL® Angled Mounts

Combi Mounts Z with Railstrip										
Dimensions										
a1 [mm]	a2 [mm]	a3 [mm]	b1 [mm]	b2 [mm]	d [mm]	h1 [mm]	h2 [mm]	l1 [mm]	l2 [mm]	s [mm]
241	——	150	150	291	4 x 18	80	163	225	——	15
241	——	150	150	291	4 x 18	80	163	——	338	15
160	——	110	100	192	4 x 14	60	113	150	——	10
160	——	110	100	192	4 x 14	60	113	——	225	10
255	——	150	150	305	4 x 18	100	177	225	——	15
255	——	150	150	305	4 x 18	100	177	——	338	15
226	——	150	150	276	4 x 18	60	149	225	——	15
226	——	150	150	276	4 x 18	60	149	——	338	15
181	——	110	100	213	4 x 14	90	134	150	——	10
181	——	110	100	213	4 x 14	90	134	——	225	10
170	——	110	100	202	4 x 14	75	124	150	——	10
170	——	110	100	202	4 x 14	75	124	——	225	10
296	130	230	200	356	8 x 18	110	219	300	——	15
296	130	230	200	356	8 x 18	110	219	——	450	15
282	130	230	200	342	8 x 18	90	205	300	——	15
282	130	230	200	342	8 x 18	90	205	——	450	15
268	130	230	200	328	8 x 18	70	191	300	——	15
268	130	230	200	328	8 x 18	70	191	——	450	15

l1 short design   l2 long design

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
640	3616	3616	6700	20000	20000	20.99	55	21055	■
960	5423	5423	10050	30000	30000	25.92	55	21055	■
480	2931	2931	3400	7500	7500	7.21	55	25079	■
720	4397	4397	5100	11250	11250	9.18	55	25079	■
437	1796	1796	6640	17000	17000	21.73	55	58394	■
437	1796	1796	6640	17000	17000	27.02	55	58394	■
768	9303	9303	6758	22000	22000	20.25	55	21055a	■
1152	13954	13954	10137	33000	33000	24.81	55	21055a	■
183	758	758	3000	7500	7500	7.70	55	24472c	■
275	1137	1137	4500	11250	11250	9.92	55	24472c	■
275	1191	1191	3400	7500	7500	7.46	55	24472d	■
413	1786	1786	5100	11250	11250	9.55	55	24472d	■
735	2917	2917	12100	30000	30000	41.40	55	38417a	■
1103	4376	4376	12100	30000	30000	51.80	55	38417a	■
981	4905	4905	12194	30000	30000	40.10	55	38417b	■
1472	7358	7358	18291	45000	45000	49.80	55	38417b	■
1468	11190	11190	11965	32500	32500	38.70	55	38417c	■
2202	16785	16785	17948	48750	48750	47.80	55	38417c	■

■ made-to-order item

Angled Mounts

Directions of Loading

Z

Y

SCHWINGMETALL® Angled Mounts

Angled Mounts						
Dimensions						
b1 [mm]	**b2** [mm]	**b3** [mm]	**b4** [mm]	**h** [mm]	**Length** [mm]	**s** [mm]
108	76	48	28	80	75	10
108	76	48	28	80	200	10
144	105	67	38	106	75	15
144	105	67	38	106	200	15

▶ **SCHWINGMETALL®-angled railstrips delivered
as standard item made of elastomer material
on the basis of chloroprene rubber.**

Spring Stiffness			Max. Loads			Mass	Elastomer		Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Type	Hardness [Shore A]		
215	86	215	2500	860	2500	1.56	CR	55	38537	■
895	307	895	600	3070	600	4.31	CR	55	38538	3978702000
320	103	320	3000	1200	3000	2.87	CR	55	38539	■
1200	315	1200	9000	3500	9000	8.05	CR	55	38540	3978704000

■ made-to-order item

Angled Mounts

Directions of Loading

Z

X
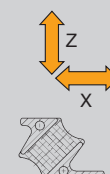
SCHWINGMETALL® Torsion Bushings
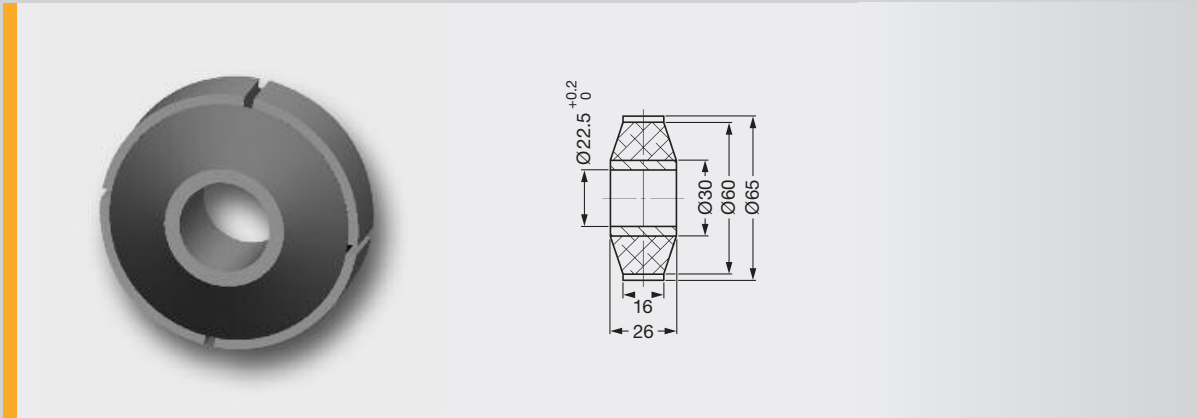
Ring Mounts									
Spring Stiffness			**Max. Loads**			**Mass**	**Elas-tomer**	**Mould No.**	**Part No.**
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	**Piece** [kg]	**Hardness** [Shore A]		
217	217	66	450	450	330	0.168	40	21489	3926402000
333	333	104	600	600	500	0.168	55	21489	3926202000
540	540	156	700	700	600	0.168	65	21489	3926102000

▶ four part outer ring,
width of slit 1.5 mm
assembly dimension Ø 64 mm

▶ radial main direction of loading,
static axial load prohibited

Characteristic Curves of Mould No. 21489

Axial (Z)

Radial (X/Y)

Directions of Loading

Ø30 F8 | +0.053 +0.020
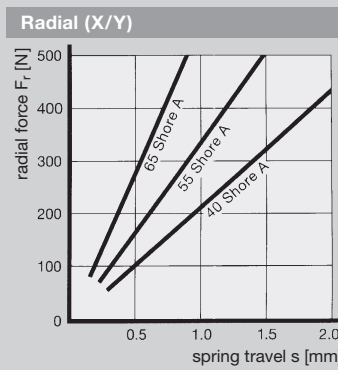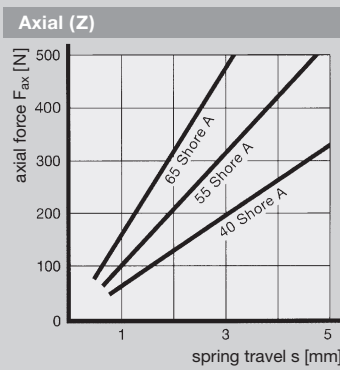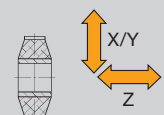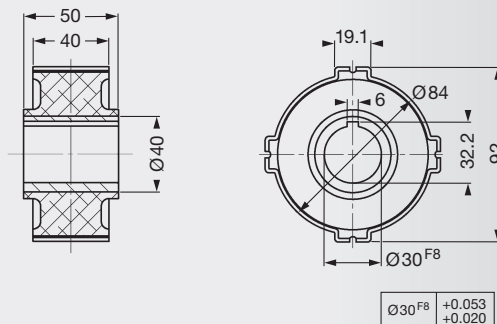
Torsion Bushing

Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
554	554	124	1100	1100	950	0.53	40	27843a	3926404000
990	990	207	1750	1750	1650	0.53	55	27843a	3926204000
1652	1652	326	1800	1800	2200	0.53	65	27843a	3926104000

▶ four part outer ring,
   width of slit 1.2 mm
   assembly dimension Ø 83 mm

▶ radial main direction of loading,
   static axial load prohibited

Characteristic Curves of Mould No. 27843a

Axial (Z)
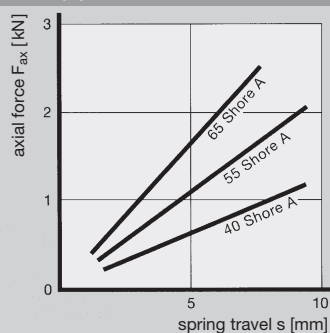
Radial (X/Y)
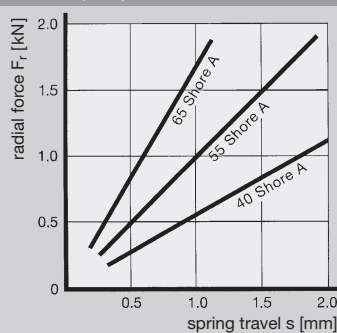
Torsion

Directions of Loading
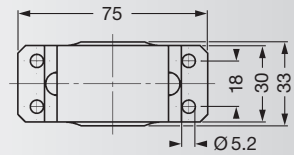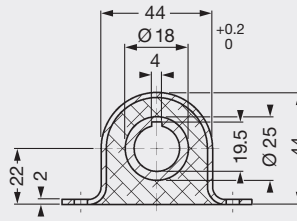
X/Y

Z

SCHWINGMETALL® Torsion Mounts

Mould No. 31510

Torsion Mounts

Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
800	152	800	850	750	850	0.153	40	31510	3936401001
1413	267	1413	1100	1100	1100	0.153	55	31510	3936201001
2187	400	2187	1150	1300	1150	0.153	65	31510	3936101001
1259	189	1259	1500	1100	1500	0.423	40	31700	3936402001
2267	344	2267	2200	1900	2200	0.423	55	31700	3936202001
3378	567	3378	2800	2200	2800	0.423	65	31700	3936102001

▶ radial main direction of loading, static axial load prohibited

Characteristic Curves of Mould No. 31510

Directions of Loading

62
Ø 25
6
+0.2
0
27.5
3.5
27.5
Ø 35
58.5

108
85
24
40
45
Ø 8.5
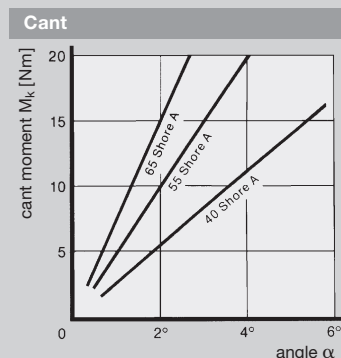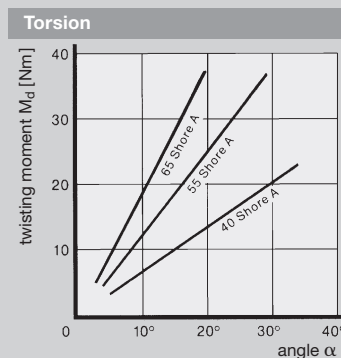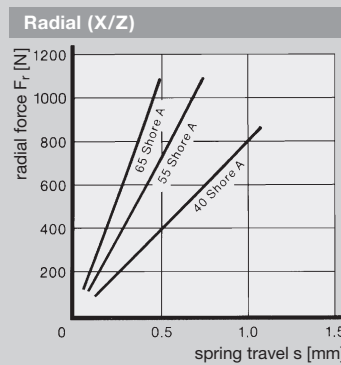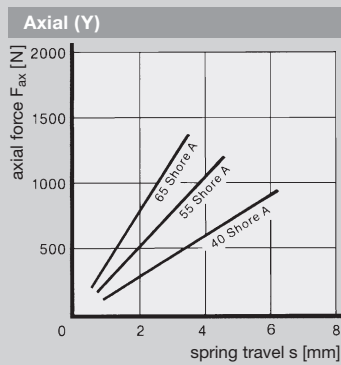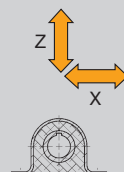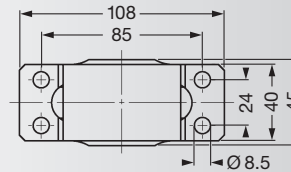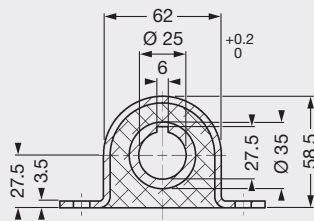
Mould No. 31700

Characteristic Curves of Mould No. 31700

Axial (Y)

axial force F$_{ax}$ [kN]
65 Shore A
55 Shore A
40 Shore A
spring travel s [mm]

Radial (X/Z)

radial force F$_r$ [N]
65 Shore A
55 Shore A
40 Shore A
spring travel s [mm]

Torsion

twisting moment M$_d$ [Nm]
65 Shore A
55 Shore A
40 Shore A
angle α

Cant

cant moment M$_k$ [Nm]
65 Shore A
55 Shore A
40 Shore A
angle α

**Directions of Loading**

Z
X
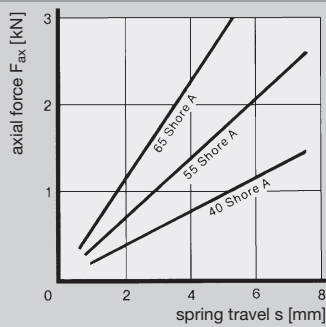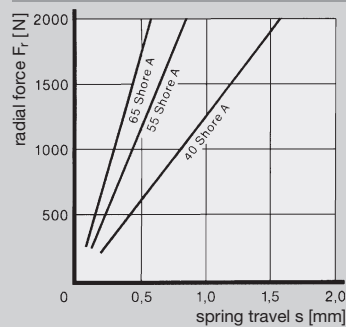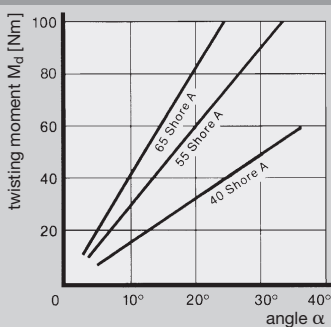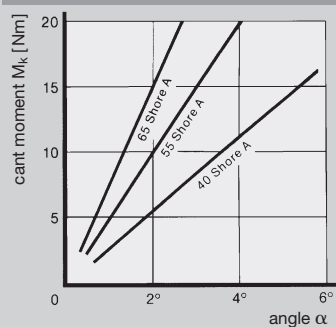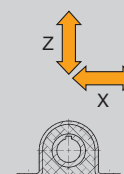
SCHWINGMETALL® Special Mounts
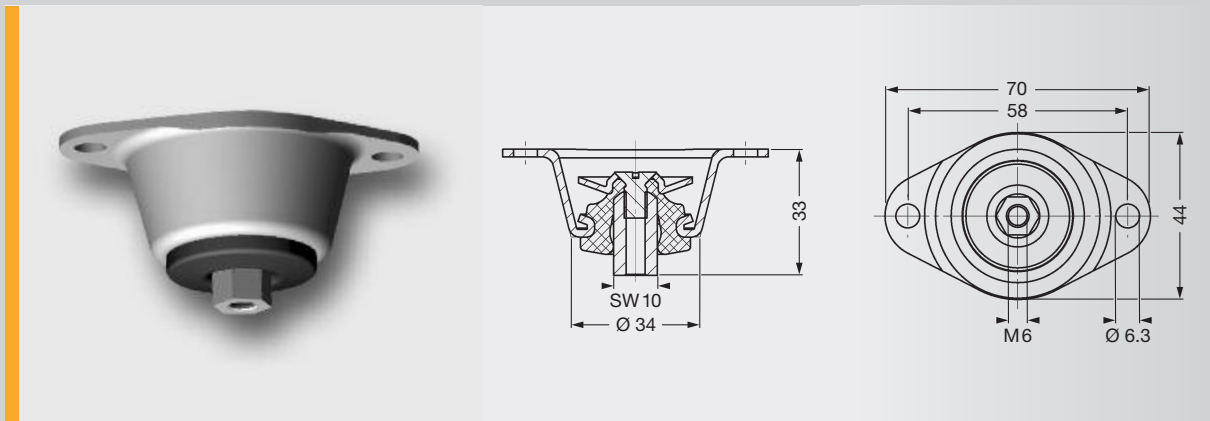
Mould No. 58500

Mould No. 27994

Bell Mounts									
Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
27	27	24	40	40	100	0.098	40	58500	3956408000
36	36	44	54	54	160	0.098	55	58500	3956208000
49	49	68	70	70	200	0.098	65	58500	3956108000
24	24	90	48	48	250	0.11	40	27994	3956404000
47	47	165	95	95	500	0.11	55	27994	3956204000
74	74	235	150	150	700	0.11	65	27994	3956104000
40	40	205	80	80	1700	0.5	40	210871	4000009125
55	55	285	110	110	2350	0.5	55	210871	4000009126
85	85	430	170	170	3000	0.5	65	210871	4000009127

Schwing
METALL

2.5
51
20
M 12

125
105
87
Ø 10.5
SW 18
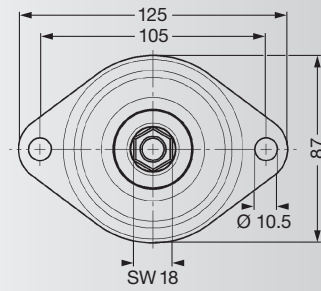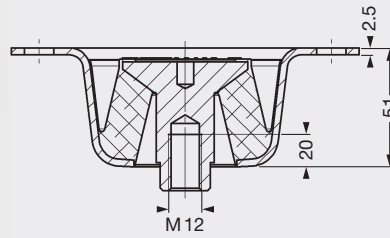
Mould No. 210871

Directions of Loading

X
Z

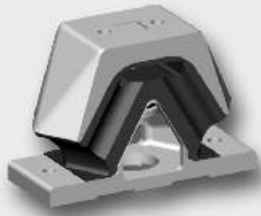**Directions of Loading**

X
Z

Directions of Loading

X
Z
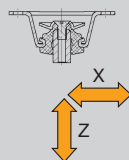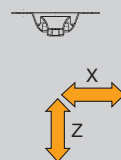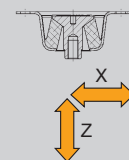
Special Mounts

SCHWINGMETALL® Special Mounts
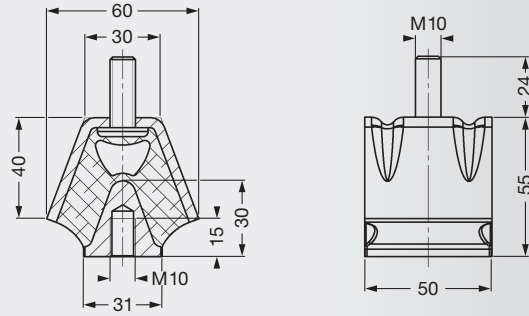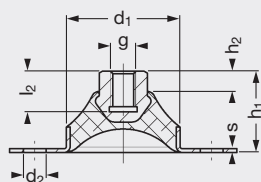
Mould No. 38451
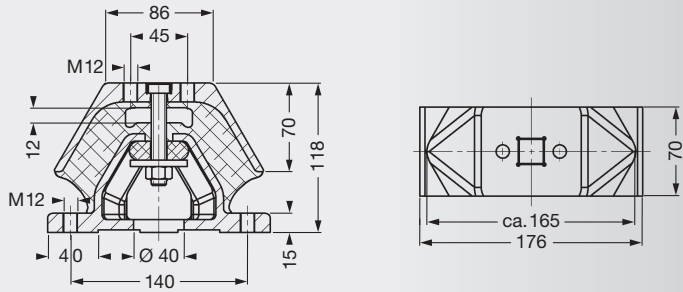
Mould No. 33660

Heavy-Duty Mounts									
Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
613	158	306	600	320	690	0.413	55	38451	3946208000
950	298	880	4500	1500	9810	3.3	55	33660	3946209000
1462	459	1354	6500	2000	14000	3.3	65	33660	3946109000

Directions of Loading
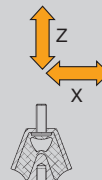
Directions of Loading
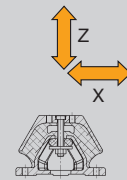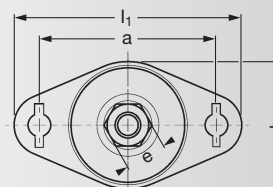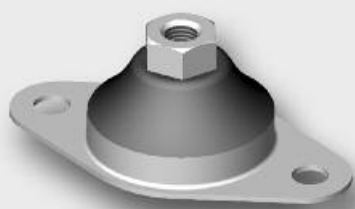
Instrument Mounts

Dimensions											Mould No.	Part No.
a [mm]	b [mm]	d$_1$ [mm]	d$_2$ [mm]	e [mm]	g [mm]	h$_1$ [mm]	h$_2$ [mm]	l$_1$ [mm]	l$_2$ [mm]	s [mm]		
45	35	30	6	SW11	M6	20	5	60	8	1.5	27860	3956401000
45	35	30	6	SW11	M6	20	5	60	8	1.5	27860	3956201000
45	35	30	6	SW11	M6	20	5	60	8	1.5	27860	3956101000
70	50	45	9	SW17	M10	32	8	90	16	1.5	27859	3956402000
70	50	45	9	SW17	M10	32	8	90	16	1.5	27859	3956202000
70	50	45	9	SW17	M10	32	8	90	16	1.5	27859	3956102000
105	80	70	13	SW24	M16	50	13	140	17	2.0	27924	3956403000
105	80	70	13	SW24	M16	50	13	140	17	2.0	27924	3956203000
105	80	70	13	SW24	M16	50	13	140	17	2.0	27924	3956103000

Instrument Mounts

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C$_x$ [N/mm]	C$_y$ [N/mm]	C$_z$ [N/mm]	F$_x$ [N]	F$_y$ [N]	F$_z$ [N]	Piece [kg]	Hardness [Shore A]		
28	28	28	50	50	100	0.025	40	27860	3956401000
54	54	54	100	100	200	0.025	55	27860	3956201000
93	93	93	120	120	250	0.025	65	27860	3956101000
44	44	44	100	100	200	0.074	40	27859	3956402000
75	75	75	175	175	350	0.074	55	27859	3956202000
122	122	122	275	275	550	0.074	65	27859	3956102000
88	88	88	400	400	800	0.250	40	27924	3956403000
160	160	160	700	700	1400	0.250	55	27924	3956203000
230	230	230	1000	1000	2200	0.250	65	27924	3956103000

Special Mounts

Directions of Loading

Z

X
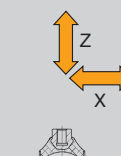
SCHWINGMETALL® Special Mounts
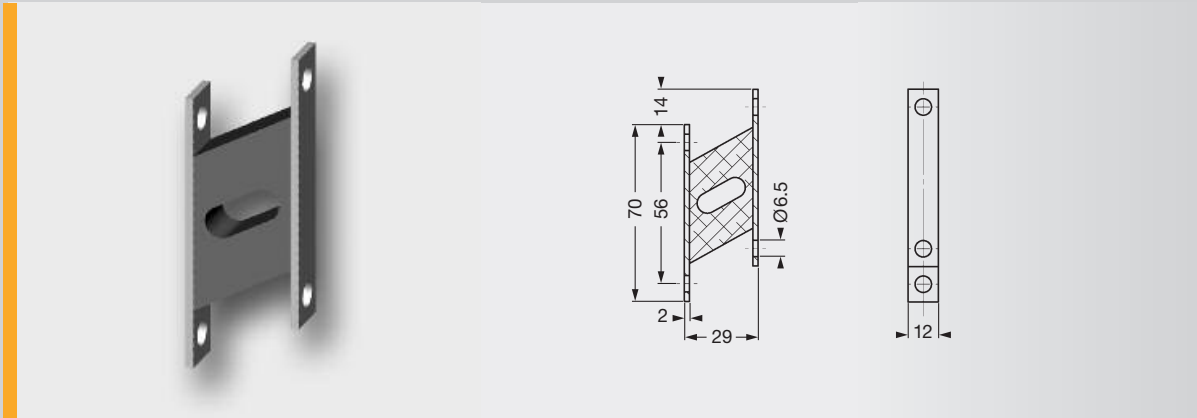
Mould No. 25187

Mould No. 25284

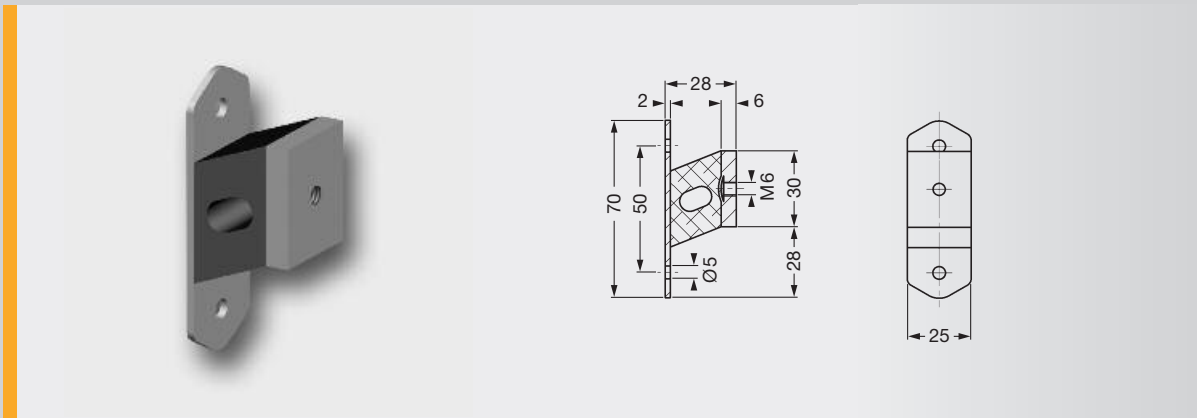| Shear Mounts									
Spring Stiffness			Max. Loads			Mass	Elas-tomer Hardness	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	[Shore A]		
20	4	4	60	20	40	0.035	40	25187	3946403000
39	6	6	110	40	80	0.035	55	25187	3946203000
60	10	10	180	50	100	0.035	65	25187	3946103000
54	9	9	125	45	90	0.072	40	25284	3946401000
104	16	16	250	75	150	0.072	55	25284	3946201000
160	25	25	360	100	200	0.072	65	25284	3946101000
43	8	8	130	40	100	0.076	40	21423	3946404000
83	14	14	205	70	200	0.076	55	21423	3946204000
128	23	23	300	120	250	0.076	65	21423	3946104000
73	20	20	180	100	200	0.127	40	24332	3946406000
140	37	37	350	185	250	0.127	55	24332	3946206000
215	57	57	500	200	280	0.127	65	24332	3946106000

Directions of Loading
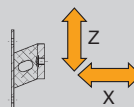
Directions of Loading
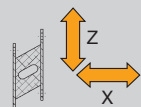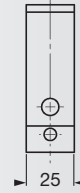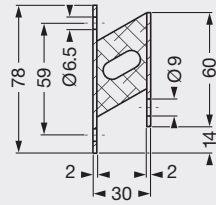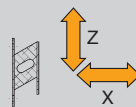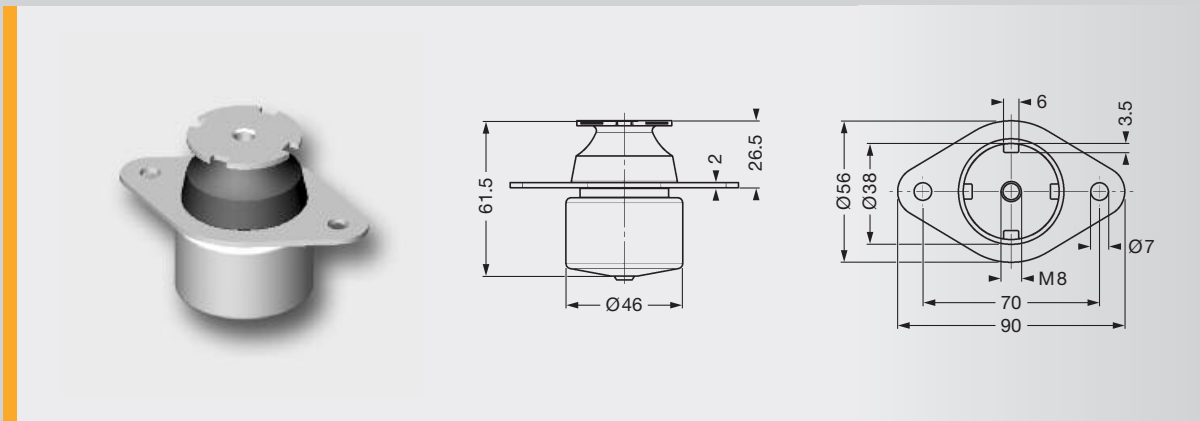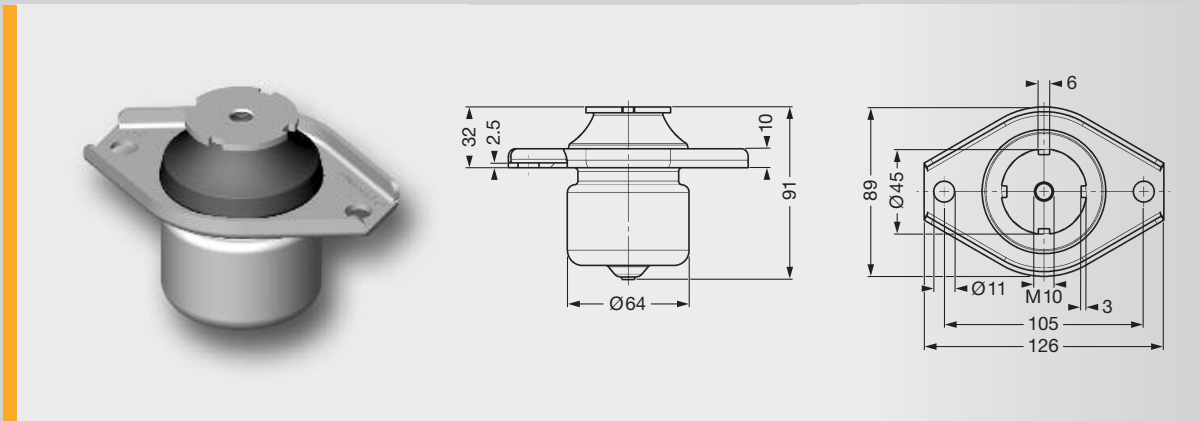
Mould No. 21423
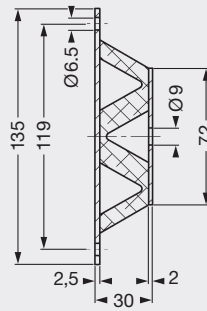
Mould No. 24332

Directions of Loading

Z
X

Directions of Loading

Z
X

Special Mounts
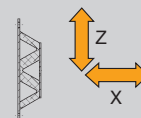
SCHWINGMETALL® Hydromounts

Hydromount V 250

Hydromount V 600

Hydromounts V Series

| Spring Stiffness				Max. Loads			Pull-Out Strength	Mass	Elas-tomer	Hydro-mount	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	C_{dyn} [N/mm]	F_x [N]	F_y [N]	F_z [N]	[kN]	Piece [kg]	Hardness [Shore A]			
15	15	49	250	77	77	300	> 3	0.200	40	V 250	102216	3978814001
45	45	159	520	194	194	750	> 9	0.593	45	V 600	100787	3978810001
58	58	228	770	458	458	1500	>15	0.775	55	V 1500	54439	3978813001
74	74	290	1080	530	530	1750	>15	0.775	60	V 1500	54439	3978812010
115	115	450	1730	750	750	2450	>15	0.775	70	V 1500	54439	3978811001
108	108	568	1520	1035	1035	3500	>30	1.100	55	V 3200	210182	3978815001

▶ **Maximum permitted slanted position to direction of loading is 15°**

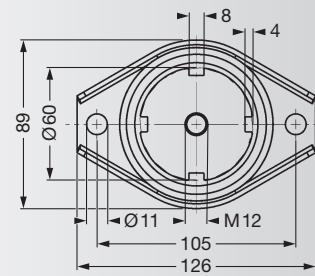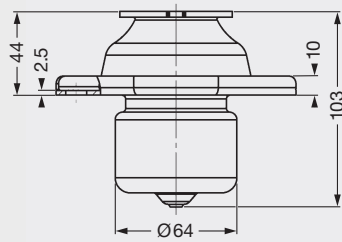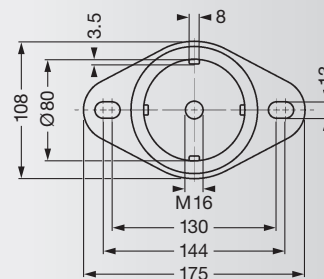▶ **The fastening flange must be entirely supported outside of the mount**
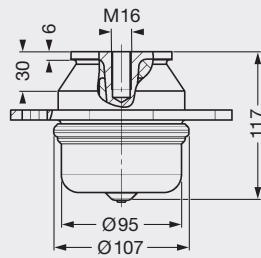
Directions of Loading
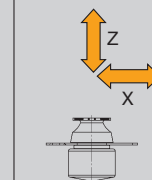
Directions of Loading
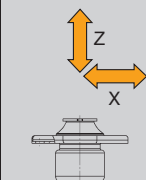
Hydromount V 1500
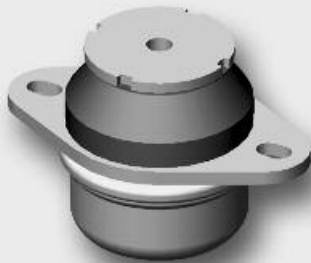
Hydromount V 3200

Directions of Loading

Z
X

Directions of Loading

Z
X
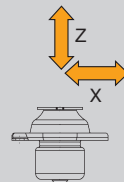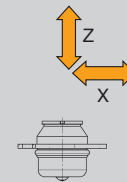
SCHWINGMETALL® Hydromounts

Characteristic Curves Hydromount V 250 40 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — frequency f [Hz]

± 3 mm
± 1 mm

Impact Characteristics[1]

force F — travel s [mm]

heat loss work
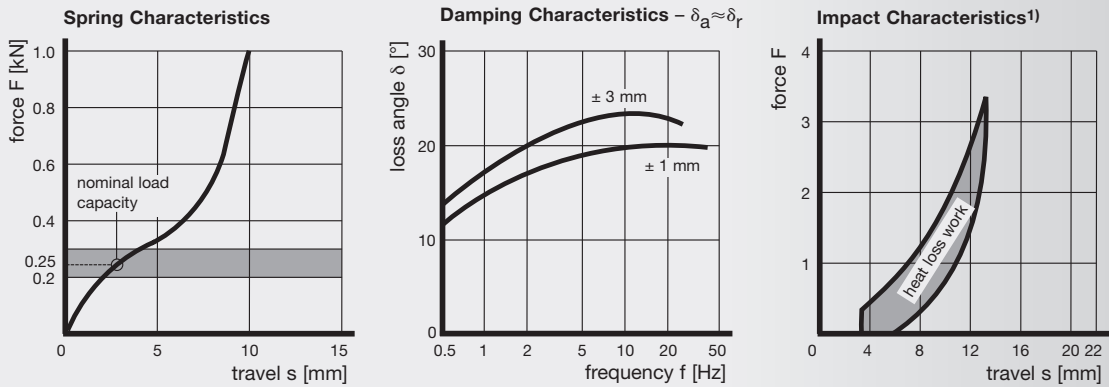
Characteristic Curves Hydromount V 600 45 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — Frequenz f [Hz]

± 3 mm
± 1 mm

Impact Characteristics[1]

force F — travel s [mm]

heat loss work
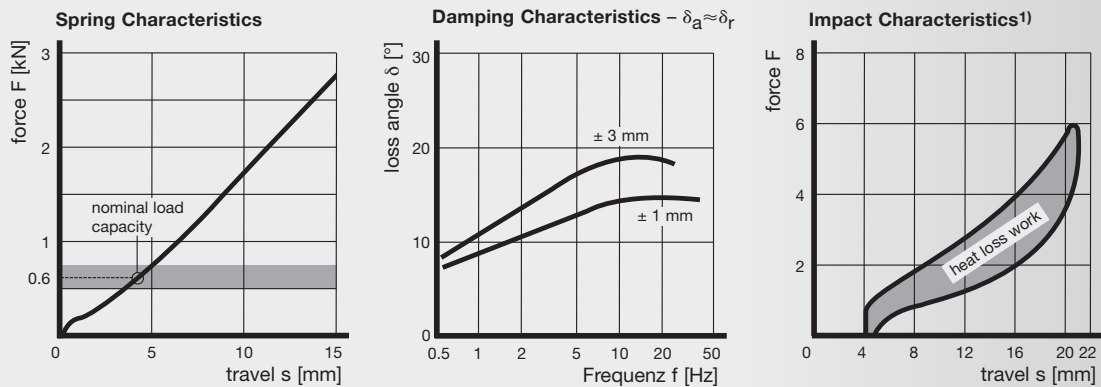
Characteristic Curves Hydromount V 1500 55 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — frequency f [Hz]

± 3 mm
± 1 mm

Impact Characteristics[1]

force F — travel s [mm]

heat loss work
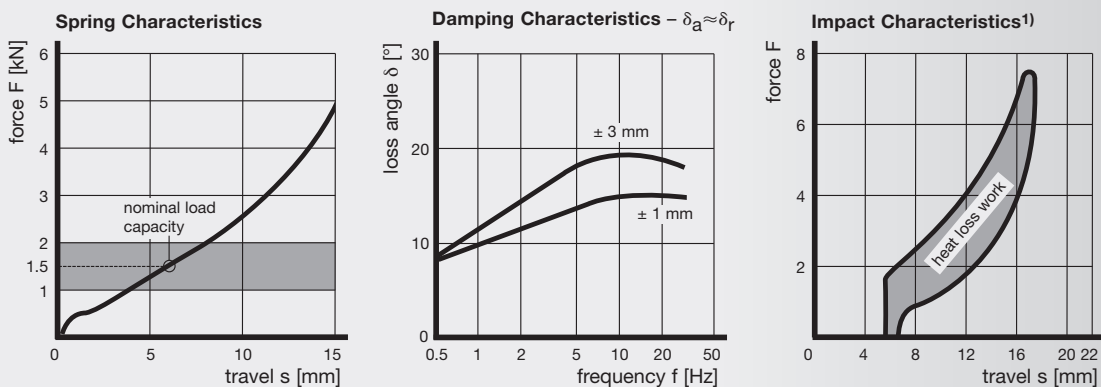
[1] impact during nominal load

Characteristic Curves Hydromount V 1500 60 Shore A

Spring Characteristics

force F [kN] / travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] / frequency f [Hz]

± 3 mm

± 1 mm
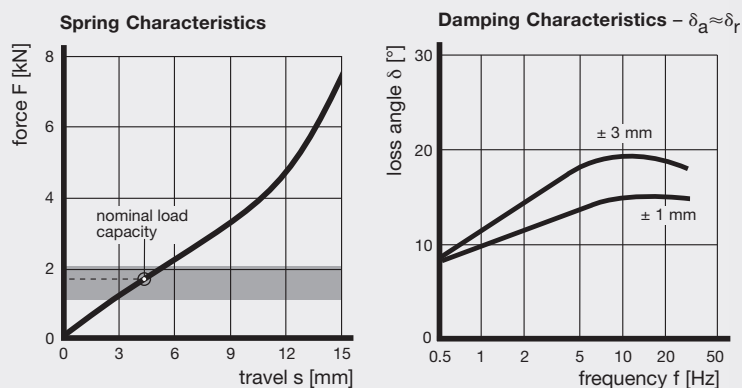
Characteristic Curves Hydromount V 1500 70 Shore A

Spring Characteristics

force F [kN] / travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] / frequency f [Hz]

± 3 mm

± 1 mm
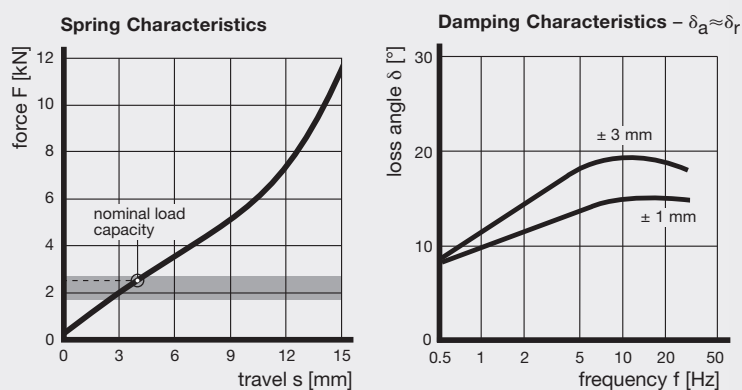
Characteristic Curves Hydromount V 3200 55 Shore A

Spring Characteristics

force F [kN] / travel s [mm]

nominal load capacity

3.2

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] / frequency f [Hz]

± 3 mm

± 1 mm

Impact Characteristics[1]

force F [kN] / travel s [mm]

heat loss work
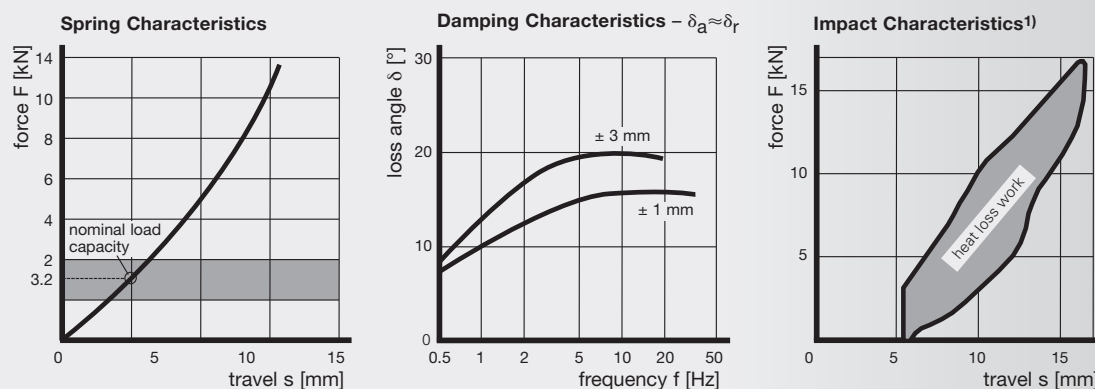
[1] impact during nominal load

Hydromounts

SCHWINGMETALL® Hydromounts
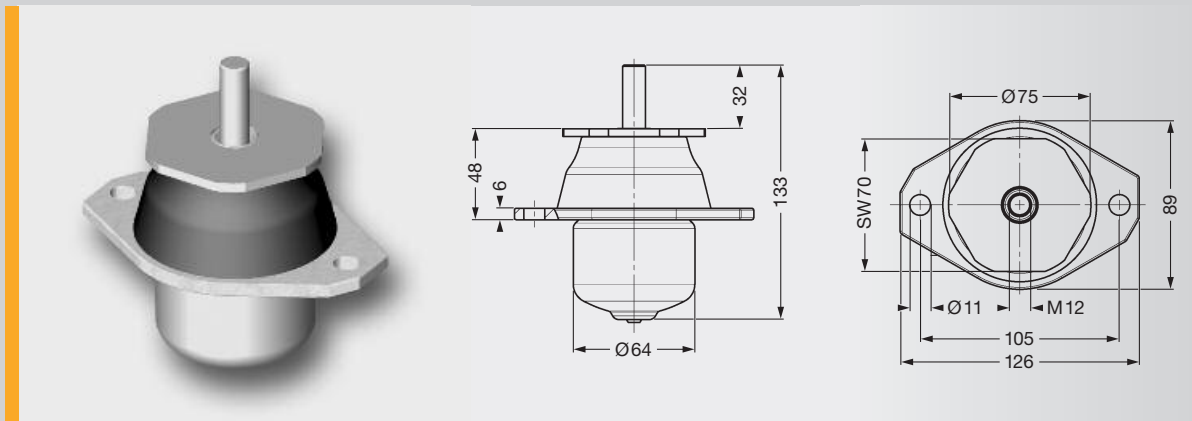
Hydromounts V plus Series									
Spring Stiffness			Max. Loads			Mass	Elas-tomer	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]		
60	60	160	300	300	600	2.8	40	210 736	4000006782
100	100	300	600	600	1500	2.8	55	210 736	4000006507
150	150	500	800	800	2500	2.8	68	210 736	4000006740

Directions of Loading
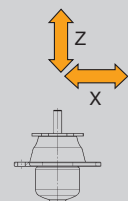
Characteristic Curves Hydromount V 1500 plus 40 Shore A

Spring Characteristics

force F [kN] vs travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] vs frequency f [Hz]

± 1 mm
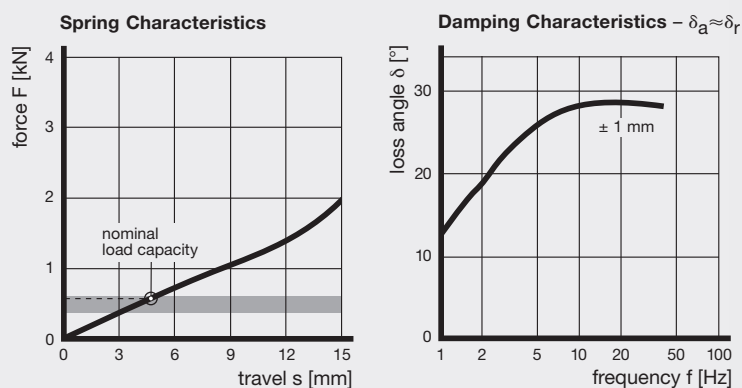
Characteristic Curves Hydromount V 1500 plus 55 Shore A

Spring Characteristics

force F [kN] vs travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] vs frequency f [Hz]

± 1 mm
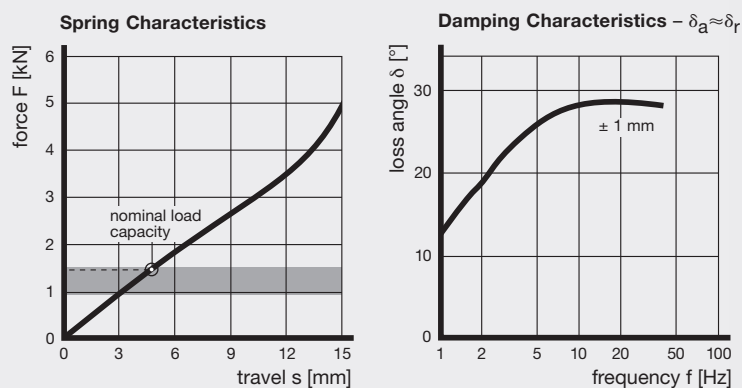
Characteristic Curves Hydromount V 1500 plus 68 Shore A

Spring Characteristics

force F [kN] vs travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] vs frequency f [Hz]

± 1 mm
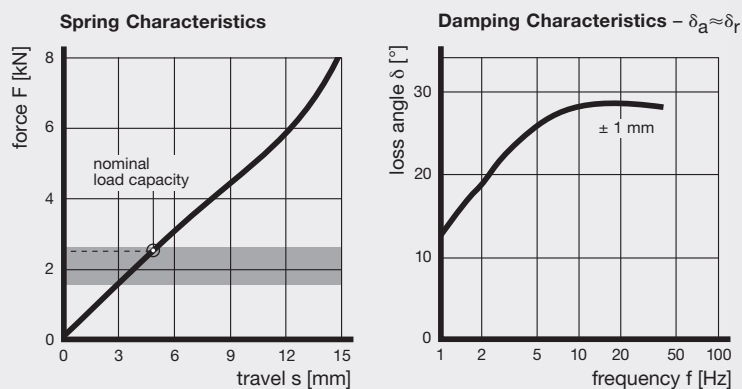
Hydromounts

SCHWINGMETALL® Hydromounts
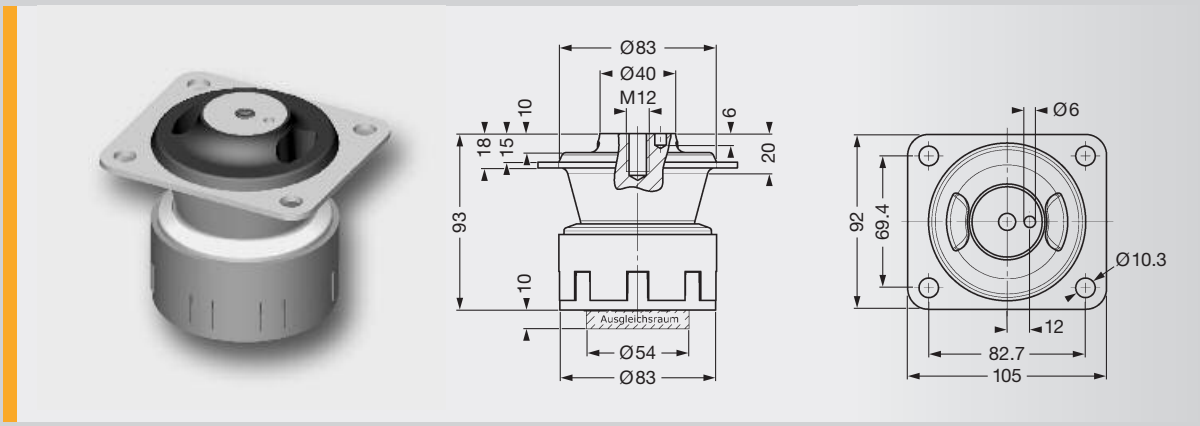
Hydromount K 2000

Hydromount K 3500 LT

Hydromounts K Series

Spring Stiffness			Max. Loads			Mass	Elas-tomer	Hydro-mount	Mould No.	Part No.
C_x [N/mm]	C_y [N/mm]	C_z [N/mm]	F_x [N]	F_y [N]	F_z [N]	Piece [kg]	Hardness [Shore A]			
1200	1500	390	4500	6000	1800	1.2	55	K 2000	212745	4000006687
500	500	250	2500	2500	1500	3.0	40	K 3500 LT	212706	4000006546
1000	1000	500	5000	5000	3000	3.0	55	K 3500 LT	212706	4000006547
2400	2400	1000	5000	5000	3500	3.2	65	K 3500	210470	4000005321

▶ **Hydromount K 2000: stopper disk in
z direction min. Ø 80 mm required**

▶ **Hydromount K 3500 LT: stopper disk in
z direction min. Ø 120 mm required**

▶ **Hydromount K 3500: stopper disk in
z direction min. Ø 120 mm required**

Directions of Loading

Z
X

Directions of Loading

Z
X
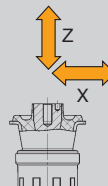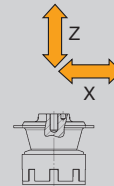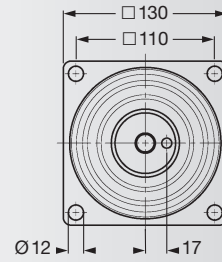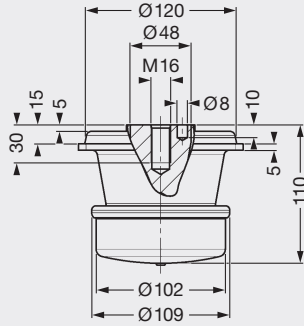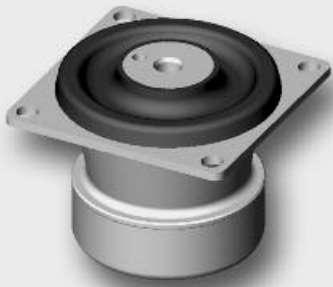
Hydromount K 3500

Directions of Loading
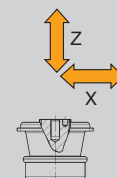
SCHWINGMETALL® Hydromounts

Characteristic Curves Hydromount K 2000 55 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — frequency f [Hz]

± 1 mm
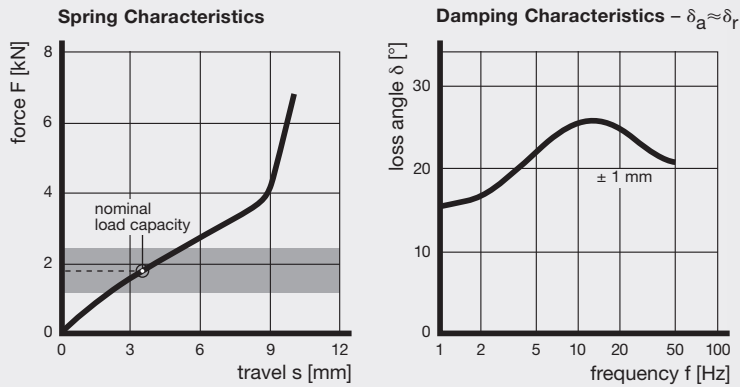
Characteristic Curves Hydromount K 3500 LT 40 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — frequency f [Hz]

± 1 mm
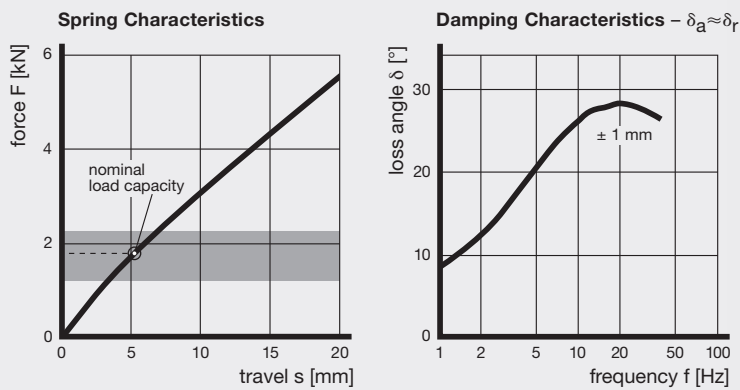
Characteristic Curves Hydromount K 3500 LT 55 Shore A

Spring Characteristics

force F [kN] — travel s [mm]

nominal load capacity

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°] — frequency f [Hz]

± 1 mm
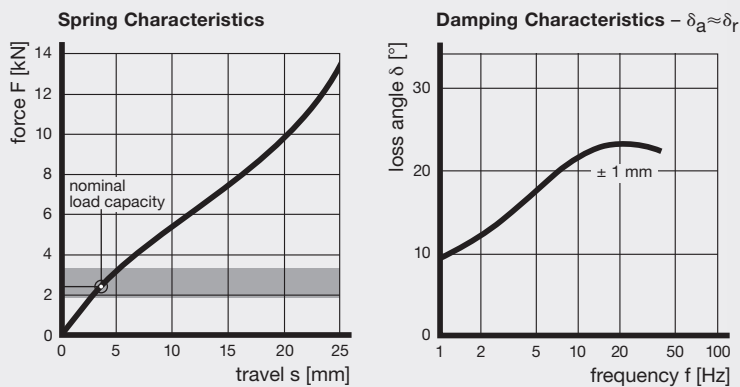
Characteristic Curves Hydromount K 3500 65 Shore A

Spring Characteristics

force F [kN]

nominal
load capacity

travel s [mm]

Damping Characteristics – $\delta_a \approx \delta_r$

loss angle δ [°]

± 1 mm

frequency f [Hz]
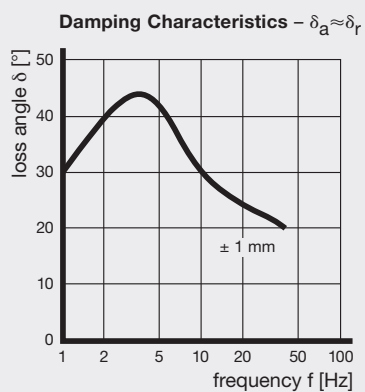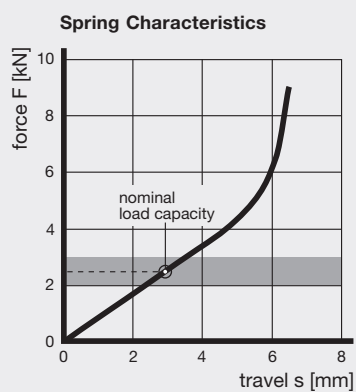
SCHWINGMETALL® Product description

A rubber-to-metal bond of proven versatility for spring bearings:

▷ **dampens vibrations and structure-borne noise**

▷ **isolates machine vibrations**

▷ **reduces accelerations**

▷ **noise protection**

ContiTech has been producing SCHWINGMETALL® rubber-to-metal bonds for more than sixty years now. They have proven themselves as design components in spring bearings for motors, machines and assemblies, for impact attenuation and in torsionally elastic couplings. They are ideally suited to minimizing annoying, damaging or even dangerous vibrations, percussions or noise.
The trend to ever lighter designs and the requirements for improved working conditions has contributed to the stepped-up and successful use SCHWINGMETALL® in many areas of engineering.

Thanks to cross-sections with favorable stress properties and evolved elastomer materials, the components are capable of fulfilling a plethora of application possibilities. Modern processes for vulcanization and elastomer-to-metal bonding guarantee high-quality products in high-volume manufacturing.
Select quality assurance systems provide for design components with precisely defined, uniform properties. Not only do the theoretical calculations work out – the resulting products also work when put to use.

SCHWINGMETALL® is available in a judiciously matched standard range of products. More than 500 parts can be supplied - with different dimensions, elastomer hardness values and metal part types. The parts are able to offer solutions for difficult vibration and design problems. Special-purpose types are available on demand for very particular cases.

SCHWINGMETALL® user support is provided by specialized regional distribution companies in close proximity to the customers as well as by the application engineering team at ContiTech Moulded Parts. Years of experience and broad know-how allow for competent analysis of vibration problems leading to practical solutions.

Construction

The constructive principle behind SCHWINGMETALL® rubber-to-metal bonding is always the same, regardless of the elastomers employed:
A bonding system is sprayed onto the metal parts, which are then inserted into the vulcanization mould. The rubber is injected and vulcanized in the heated mould.

Schematic design	figure 1
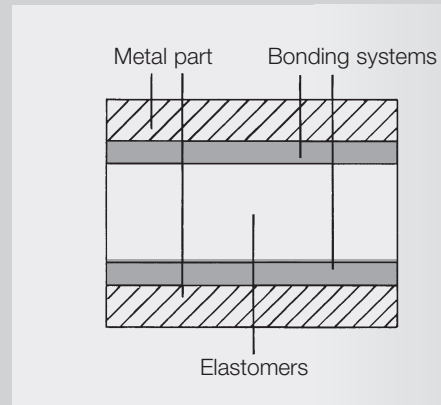
SCHWINGMETALL®
Schwingmetall rubber-to metal bond

Elastomers

The shape and material of the elastomer spring body comply with an exactly defined spring behavior. Continental offers a practice-oriented range composed of NR, CR and acrylonitrile polymers with various hardness values. Each material combines outstanding material properties with cost-efficient production possibilities.

Natural rubber (NR) is used for most of the SCHWINGMETALL® applications. It exhibits distinctively good rebound resilience and low creep values. While NR is not resistant to the sustained effects of oil, occasional and minor use of oil does not impair proper functioning and service life.

Chloroprene rubber (CR) is oil resistant to a certain extent and is the preferred choice for applications in which enhanced weathering resistance is required. Acrylonitrile-butadiene rubber (NBR) is used for applications requiring oil resistance.

Properties of different elastomers			table 1
Elastomer	**Natural rubber**	**Chloroprene rubber**	**Acrylonitrile-butadiene rubber**
Symbol as per DIN ISO 1629	NR	CR	NBR
Hardness range as per DIN 53 505 [Shore A]	40 ... 80	40 ... 80	45 ... 80
Tensile strength for the most favorable hardness range as per DIN 53 504 [N/mm^2]	25	18	18
Elongation at tear for the most favorable hardness range as per DIN 53 504 [%]	500	350	350
Rebound resilience as per DIN 53 512	excellent	very good	very good
Damping as per DIN 53 513	low	medium	medium
Temperature application range [°C]	-50 ... 70[1]	-30 ... 90	-25 ... 80
Compression set as per DIN 53 517	low	low	low
Resistance to aging as per DIN 53 578	moderate	very good	good
Resistance to weathering	moderate	very good	moderate
Electric properties	Antistatic insulation for low hardness levels, antistatic to conductive for higher hardness levels		
Resistance to Water alkalis acids oil, greases	good good good minor	moderate good good moderate	good good good good

[1] temperature resistant special designs upon request

Metal parts

The metal parts are adapted to provide the properties required in actual practice. Easy to attach, they conduct and distribute the load in the elastomer spring body.
The metal surfaces are protected from corrosion by means of painting or electrolytic zinc extraction with follow-up passivation.

Bonding

Bonding between elastomer spring bodies and metal parts is effected by bonding agents employed at the time of vulcanization. The two-layer systems used – consisting of a primer and a cover coat – guarantee a strong, corrosion-resistant bond.

Modern processes for pretreating metal parts and vulcanization, along with constant quality inspections at all stages of processing, ensure a uniformly high standard.

Characteristics and Theory

SCHWINGMETALL® How it functions

Basic remarks

Machines generate vibration during operation. This vibration, in turn, gives rise to percussions and noise. If the percussions are strong enough, they can cause damage to buildings and machines or impair the proper functioning of other machines. In many cases vibration or structure-borne noise is transmitted to adjacent rooms by a building's structural elements – pipelines, for example. If corresponding "sounding boards" are present, (ceilings, walls, radiators), the non-isolated structure-borne noise can become air-borne noise and reach a level that is intolerable for the human ear.

SCHWINGMETALL® minimizes the transmission of percussions and structure-borne vibration to the surroundings (active interference suppression) or the effects of vibration from the environment on sensitive apparatus (passive interference suppression). SCHWINGMETALL® has the advantage of cushioning – and thus insulating – as well as damping and is therefore superior to other spring mounts made exclusively of metal materials. In the latter case comparable functional effects are much more difficult to obtain.

To achieve good results with SCHWINGMETALL®, it is necessary to take into account the laws of vibration physics applying for all spring mounts. The following remarks take up the terms and variables required for the purpose of proper understanding and calculation.

| The double function of SCHWINGMETALL® | figure 2 |

**SCHWINGMETALL®
Spring and damper
in a single element**
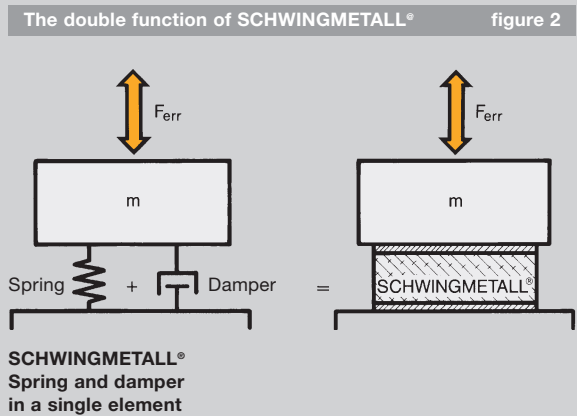
Spring System

A force F or a torque M, acting on an SCHWINGMETALL® mount deforms it by a spring deflection s or a twisting angle α. The degree of deformation depends on the magnitude of the Force F or the torque M, the elastomer hardness H and the geometric shape of the SCHWINGMETALL® mount.

The ratio of force F to spring deflection s or the torque M to the twisting angle α is referred to as the spring rate or characteristic c or the torsional spring rate c_v.

$$c = \frac{F}{s} \quad \text{N/mm}$$

$$c_v = \frac{M}{\alpha} \quad \text{Nm/Degree}$$

$$c_v = \frac{M}{\alpha} \cdot 57,3 \quad \text{Nm/rad}$$

The geometric shape of the SCHWINGMETALL® mount and the type of stress (pressure, shearing, tensile stress) influences the shape of the deflection curve. It can be progressive, linear or degressive. The spring rates c or c_v for linear characteristic curves remain constant over the entire spring range. The spring rates depend on spring deflection in the case of progressive or degressive characteristic curves.

$$c = f(s) = \frac{dF}{ds} \quad \text{N/mm}$$

$$c_v = f(\alpha) = \frac{dM}{d\alpha} \quad \text{Nm/Degree}$$

$$c_v = f(\widehat{\alpha}) = \frac{dM}{d\widehat{\alpha}} \quad \text{Nm/rad}$$

| Deflection characteristic | figure 3 |
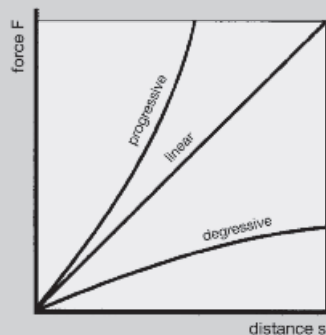
In these cases, the spring rate is determined by plotting the tangent so that it touches the characteristic curve at working point A. (see figure 4a + 4b) The degree of slope of the tangent yields the value for the spring rate c. It is calculated on the basis of the following formulas:

$$c = \frac{dF}{ds} = \frac{F_A}{s_{sub_A}} \quad N/mm$$

$$c_v = \frac{dM}{d\widehat{\alpha}} = \frac{M_A}{\widehat{\alpha}_{sub_A}} \quad Nm/rad$$

SCHWINGMETALL® mounts subject to pressure tend to have progressive characteristic curves, those subject to shearing and tensile stress tend to have a degressive characteristic curve.

The degree of progressivity or degressivity depends on the geometry of the SCHWINGMETALL® mount and the magnitude of the deformation. Linear characteristic curves result from a superimposition of pressure- and shear-related stress over large deformation ranges.

Subtangent to progressive caracteristic curve   figure 4a
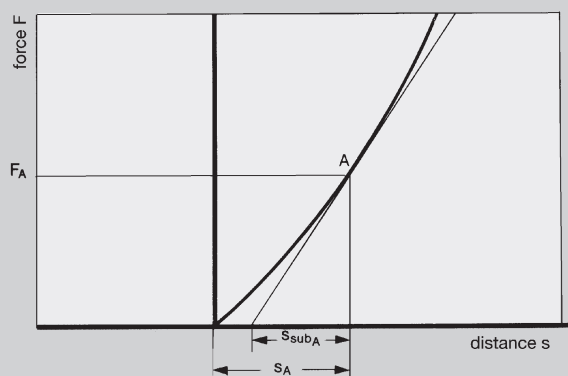
Subtangent to degressive caracteristic curve   figure 4b
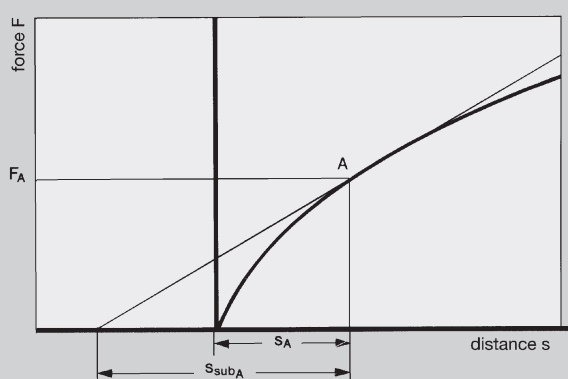
**Determination of the spring rate c
(Determination of the twisted spring rate c_v is similar)**

SCHWINGMETALL® How it functions

Natural vibration frequency, resonance

Every spring/mass system executes vibrational movements as soon as it is excited. In real-world situations a distinction is made between two types of excitation:

• shock excitation
• continuous excitation

If a system is deflected out of its position of rest by a single impact – e.g. by punching – it oscillates at its vibration frequency (natural frequency) until the system's additional kinetic energy undergoes thermal conversion as a result of damping.

A continuously excited system – e.g. as a consequence of the residual imbalance of rotating machines – always oscillates at the excitation vibration frequency of the source of excitation (exciter frequency).

There is resonance if the vibration frequency of the source of excitation equals the system's natural vibration frequency. If the system had no damping, the amplitude of the vibrations would assume an infinite size.

The natural vibration frequency depends on the spring rate c and the value of the mass m. It is calculated on the basis of the following formula:

$$v_e = \frac{30}{\pi} \cdot \sqrt{\frac{c}{m} \cdot 1000} \quad \text{min}^{-1}$$

c in N/mm
m in kg

The natural frequency amounts to 1/60 of the value of the natural vibration frequency.

$$f_e = \frac{1}{2 \cdot \pi} \cdot \sqrt{\frac{c}{m} \cdot 1000} \quad \text{Hz}$$

In the case of linear spring characteristics there is a direct relationship between the static spring deflection s – as a consequence of the mass m – and the spring rate c. Taking this into account, the natural vibration frequency or natural frequency can be determined as follows, provided the static spring deflection is known:

$$v_e \approx \frac{300}{\sqrt{s}} \quad \text{min}^{-1}$$

$$f_e \approx \frac{5}{\sqrt{s}} \quad \text{Hz}$$

s in cm

In the case of progressive or degressive spring characteristics, the value of the subtangent s_{sub} must be inserted in the above formula instead of the real spring deflection s.

Excitation/Natural frequency   **figure 5**
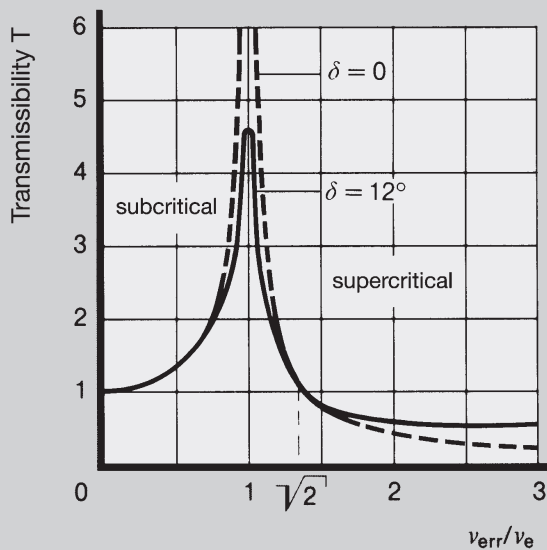
**Transmissibility T
versus the ratio of the
vibration frequency v_{err}/v_e**

Isolation

As regards vibration, isolation means reducing excitation forces so that only a small portion of them are transmitted to the underlying foundation. A distinction is made between vibration isolation and isolation of structure-borne noise.

The isolation effect of SCHWINGMETALL® is referred to as active interference suppression if the interference emanating from a machine is stopped before reaching the surroundings. Passive interference suppression, on the other hand, refers to the shielding of sensitive equipment from interference emanating from the surroundings. Depending on the type of vibration excitation, the interference can be periodic or in jolts.

Vibration isolation

In the case of vibration isolation, the isolating effect of SCHWINGMETALL® mounts is due to the fact that above the resonance range, the force of the inert mass of the spring-mounted machine no longer vibrates in the same direction as the excitation force but counteracts it with an out-of-phase reaction. The prerequisite for SCHWING-METALL®'s isolating effect is thus that the excitation vibration frequencies v_{err} of the exciting forces and torque must be at least $\sqrt{2} = 1.41$-fold greater than the respective natural vibration frequencies.

$$v_{err} > 1{,}41 \cdot v_e$$

The value for the isolating effect is determined using the following formula for degree of isolation η or for the isolation D.

$$\eta = 1 - \frac{1}{\left(\dfrac{v_{err}}{v_e}\right)^2 - 1}$$

$$D = 20 \lg \left[\left(\frac{v_{err}}{v_e}\right)^2 - 1 \right] \quad \text{dB}$$

The above formulas apply for a single-mass oscillator. It assumes that the foundation has infinitely large mechanical driving point impedance, i.e. that it consists of an infinitely large and rigid mass. If these conditions are not met, there may be differences between the calculated and the measured values, depending on the foundation's mechanical driving point impedance.

◀ Diagramm calculation of an Schwingmetall-element see on the swing out page (page 3)
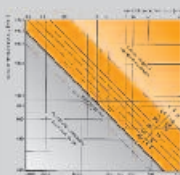
Isolation of structure-borne noise

Structure-borne noise expands in solid and fluid media in waves. The wave is partially reflected when it hits the point where two different materials meet and it's further expansion is hindered. The larger the impedance jump p is, the greater the reflection:

$$p = \frac{Z_1}{Z_2} = \frac{\sqrt{E_1 \cdot \varrho_1}}{\sqrt{E_2 \cdot \varrho_2}} = \frac{c_1 \cdot \varrho_1}{c_2 \cdot \varrho_2}$$

Z - impedance
E - elasticity modulus
ϱ - Density
c - speed of noise

Elastomer materials generally have a low modulus of elasticity and low density. The materials used in mechanical engineering and construction, on the other hand, have a high modulus of elasticity and high densities. This explains why spring mounts composed of elastomer materials are so exceptionally effective in isolating structure-borne noise.

A calculation example should serve to illustrate the effectiveness of a spring mount in hindering the wavelike spread of structure-borne noise. The reflected - i.e. the hindered - structure-borne noise intensity R can be calculated from the impedance ratio p:

$$R = \frac{(p - 1)^2}{(p + 1)^2}$$

Assuming in the case of steel that

$E = 2{,}1 \cdot 10^5$ N/mm^2; $\varrho = 7{,}85$ g/cm^3

and for elastomer material (natural rubber, 55 Shore A) that

$E = 10{,}5$ N/mm^2; $\varrho = 1{,}2$ g/cm^3

then the impedance ratio p works out to

$$p = 362$$

and the isolation R to

$$R = 0{,}989$$

In other words, practically 99% of the structure-borne noise waves are reflected.

SCHWINGMETALL® How it functions

Damping

Damping refers to the extraction of kinetic energy from a vibrating system by means of thermal conversion. It has the effect of keeping the vibration deflection within acceptable limits once the resonance point has been passed.

Elastomer materials exhibit much greater damping properties than metal. This is due to internal material friction. (see figure 6)

The phase angle δ serves to indicate the material damping characteristic. It indicates by how much this force – made up of an elastic and a damping share – outpaces elastic deformation.

The phase angle δ and the damping characteristic are related in the following ways:

Build-up V   **figure 6**
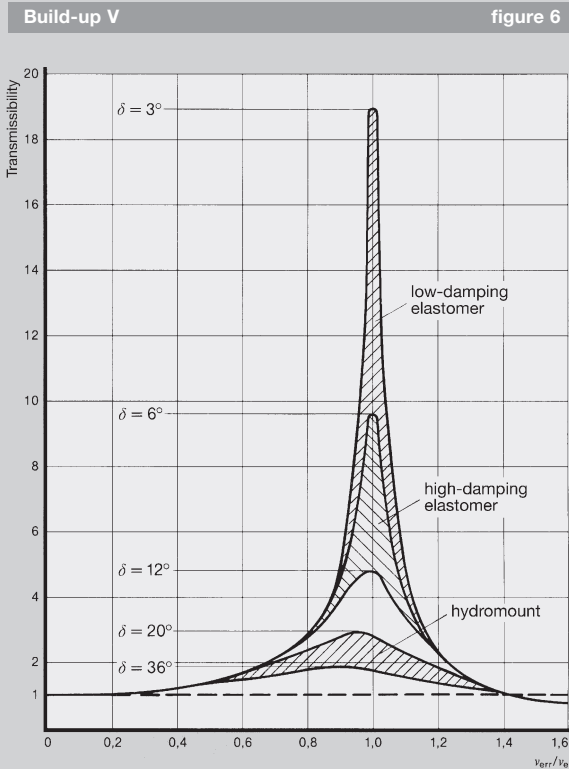
Build-up V depending on the ratio of the vibration frequencies in ν_{err}/ν_e

$$d = \text{tg } \delta \qquad \text{mechanical loss factor}$$

$$\psi = 2 \cdot \pi \cdot \text{tg } \delta \qquad \text{comparative damping}$$

$$V = \frac{1}{\text{tg } \delta} \quad (\text{for } \nu_e = \nu_{err}) \qquad \text{build-up}$$

$$D_{rel} = \frac{2 \cdot \pi \cdot \sin \delta}{4 + \pi \cdot \sin \delta} \qquad \text{relative damping}$$

$$\Lambda = \pi \cdot \text{tg } \delta \qquad \text{relatilogarithmic decrement}$$

$$D = \frac{1}{2} \cdot \text{tg } \delta \qquad \text{degree of damping}$$

δ [° (Degree)]	d [dB]	ψ	V	D_{rel}	Λ	D
Damping characteristic as a function of phase angle δ						table 2a
1.0	0.017	0.110	57.290	0.027	0.055	0.009
1.5	0.026	0.165	38.188	0.040	0.082	0.013
2.0	0.035	0.219	28.636	0.053	0.110	0.017
2.5	0.044	0.274	22.904	0.066	0.137	0.022
3.0	0.052	0.329	19.081	0.079	0.165	0.026
3.5	0.061	0.384	16.350	0.092	0.192	0.031
4.0	0.070	0.439	14.301	0.104	0.220	0.035
4.5	0.079	0.494	12.706	0.116	0.247	0.039
5.0	0.087	0.550	11.430	0.128	0.275	0.044
5.5	0.096	0.605	10.385	0.140	0.303	0.048
6.0	0.105	0.660	9.514	0.152	0.330	0.053
6.5	0.114	0.716	8.777	0.163	0.358	0.057
7.0	0.123	0.771	8.144	0.175	0.386	0.061
7.5	0.132	0.827	7.596	0.186	0.414	0.066
8.0	0.141	0.883	7.115	0.197	0.442	0.070
8.5	0.149	0.939	6.691	0.208	0.470	0.075
9.0	0.158	0.995	6.314	0.219	0.498	0.079
9.5	0.167	1.051	5.976	0.230	0.526	0.084
10.0	0.176	1.108	5.671	0.240	0.554	0.088
11.0	0.194	1.221	5.145	0.261	0.611	0.097
12.0	0.213	1.336	4.705	0.281	0.668	0.106
13.0	0.231	1.451	4.331	0.300	0.725	0.115
14.0	0.249	1.567	4.011	0.319	0.783	0.125
15.0	0.268	1.684	3.732	0.338	0.842	0.134
16.0	0.287	1.802	3.487	0.356	0.901	0.143
17.0	0.306	1.921	3.271	0.373	0.960	0.153
18.0	0.325	2.042	3.078	0.391	1.021	0.162
19.0	0.344	2.163	2.904	0.407	1.082	0.172
20.0	0.364	2.287	2.747	0.423	1.143	0.182
21.0	0.384	2.412	2.605	0.439	1.206	0.192
22.0	0.404	2.539	2.475	0.455	1.269	0.202
23.0	0.424	2.667	2.356	0.470	1.334	0.212
24.0	0.445	2.797	2.246	0.484	1.399	0.223
25.0	0.466	2.930	2.145	0.498	1.465	0.233

Standard SCHWINGMETALL® products made of NK with elastomer hardness values of 40, 55 and 65 Shore A have the following damping characteristics:

Elastomer-hardness	δ [° (Degree)]	d [dB]	ψ	V	D_{rel}	Λ	D
Damping characteristic as a function of phase angle δ							table 2b
40 Shore A	2.5	0.044	0.274	22.904	0.066	0.137	0.022
55 Shore A	4.5	0.079	0.494	12.706	0.116	0.247	0.039
65 Shore A	7.0	0.123	0.770	18.144	0.175	0.386	0.061

Characteristics and Theory

SCHWINGMETALL® Application

SCHWINGMETALL® Mounts are products with a long service life and operational reliability. This assumes, of course – in addition to the right design – that the mounts are used as intended. The following tips help are meant to help customers gain full advantage from SCHWINGMETALL® products.

Planning and design tips

Load capacity

SCHWINGMETALL® mounts can be used in such a way that the static forces at work trigger compressive, shearing, torsional shear or compressive-shearing strain relative to the spring body. Subjection to the stained effect of static tensile forces is not permitted. Intermittent tensile forces resulting from impact stress are easily absorbed.

The figures given below are intended only as reference values and apply to all elastomer hardness values and types. In individual cases the stress levels indicated can be exceeded. This should be clarified beforehand.

Permitted tensions			table 3
Type of load	**Permitted tension**		
	static [N/mm^2]	dynamic[1] [N/mm^2] (10 Hz)	Impact[2] [N/mm^2]
Compression	0.5	± 0.125	2.0
Shearing	0.2	± 0.050	0.6
Tensile stress	——	——	1.5
Torque-to-bore v.r.	0.3	± 0.075	0.9
Compression-shearing (45°)	0.5	± 0.125	2.0

[1] Reference vibration frequency ν_{err} = 600 min^{-1}

[2] The values for permissible impact stressing apply in the case of compression/shear mounts, railstrips and combi mounts.

Tolerances

The spring characteristics of SCHWINGMETALL® mounts depend on the elastomer hardness H and the geometric dimensions. The tolerance range of hardness H amounts to ± 5 Shore A. This fluctuation range yields a spring rate tolerance of approx. ± 20 % and thus a tolerance within the calculated natural vibration frequencies of approx. ± 10 %. By means of special measures the hardness tolerance can be narrowed to ± 3 Shore A. The spring rate tolerance drops correspondingly to ± 15 % and that of the natural vibration frequencies to ± 7 %.

The dimensional tolerances are defined in DIN ISO 3302-1. SCHWINGMETALL® mounts fall under class M3. The following table gives the permitted dimensional deviations to DIN ISO 3302-1 M3 class M 3 as a function of the nominal dimension range for mould-related and non-mould-related dimensions.

The adherence of rubber coating (Gummihaut) is permitted to a certain extent, even if that is not clear from the drawings presented here. It is often necessary for production reasons. There are no metal tolerances but only the rubber tolerances indicated in the table.

Permitted size deviation*				table 4
Nominal size range			Permitted size deviation	
[mm]			F [± mm]	C [± mm]
	up to	6.3	0.25	0.4
over 6.3	up to	10.0	0.30	0.5
over 10.0	up to	16.0	0.40	0.6
over 16.0	up to	25.0	0.50	0.8
over 25.0	up to	40.0	0.60	1.0
over 40.0	up to	63.0	0.80	1.3
over 63.0	up to	100.0	1.00	1.6
over 100.0	up to	160.0	1.30	2.0

F = mould-dependent dimension   *DIN ISO 3302-1 class M3
C = mould-independent dimension

Creep

Creep is a time-dependent increase in spring deflection for a spring under constant load. The phenomenon is a consequence of relaxation, i. e. it results from a gradual loss in the resilience of a spring subjected to constant deformation over time. It occurs with such a high degree of inertness that it does not take part in the vibrational movements of the SCHWINGMETALL® mounts.

Creep is influenced by
• material
• spring rate in the load point
• shape of the characteristic curve

In the case of a linear spring characteristic at constant temperature, creep is linearly proportional to the time logarithm. It is independent of the type of stress (compression, shear).

The creep K of an elastomer material is defined as follows:

$$K = \frac{\Delta s}{s_6 \cdot n}$$

Δs – Increase in spring deflection in mm

s_6 – Spring deflection after 6 s under static load in mm

n – Number of time decades

The values shown in the table were determined for SCHWINGMETALL® compression/shear mounts with a diameter of 50 mm, 45 mm high and are subject to a tolerance range of ± 15 %. Creep values for large-volume parts may be approx. 20 % greater.

The slight increase in spring deflection due to creep can generally be ignored. The increase in spring deflection over time must be taken into account only in the case of assemblies whose shafts require a high degree of true alignment and whose driving and driven units are not mounted on a common foundation. In view of the fact that half the total value of the increase in spring deflection for an approx. 20-year time period is already reached after 24 h of stress, final alignment can be carried out after just one day of service.
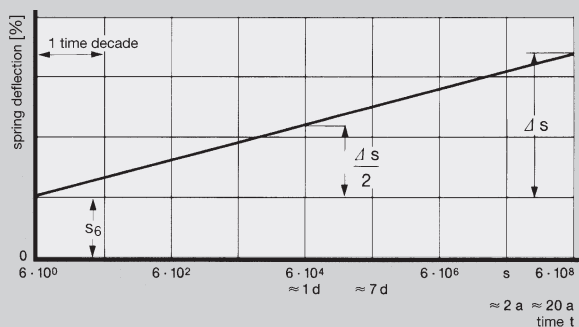
Creep values for SCHWINGMETALL® standard elements			table 5
Elastomer hardness	Creep		
	NR	CR	NBR
40 Shore A	0.02	0.04	0.04
55 Shore A	0.03	0.05	0.04
65 Shore A	0.04	0.05	0.05

NR – natural rubber
CR – chloroprene rubber
NBR – nitrile rubber

| Spring deflection s dependent on the load time t	figure 7

F = mould-dependent dimension
C = mould-independent dimension

SCHWINGMETALL® Application

Stiffening factor

The spring characteristics of elastomer springs under dynamic stress differ from the corresponding quasistatic spring characteristic values. The spring rate depends on the speed of deformation and the amplitude of deflection. While the speed-related stiffening in the spring rate is too negligible to merit consideration, the amplitude-dependent stiffening should be taken into account in considering measures for isolating structure-borne noise.

Stiffening factor v	figure 8
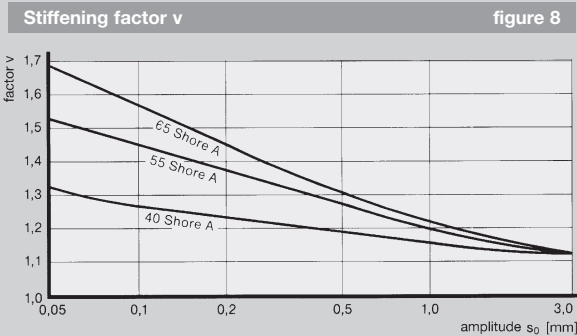
Stiffening factor v versus the amplitude s_0 for elastomer materials of various hardness values on a natural rubber basis

Temperature influences

SCHWINGMETALL® mounts can be used in a wide temperature range. The temperature of the elastomer spring body influences the spring rate and the damping properties of the SCHWINGMETALL® mount and has consequences with respect to service life. The rule of thumb for rough estimates says that assuming identical conditions otherwise, a temperature increase of 10°C reduces the service life of the SCHWINGMETALL® mount by half.

Temperatures above the permitted temperature range over a longer period of time effect a permanent and considerable hardening of the vulcanized material and thus a sustained increase in the spring rate. Other temperature increases lead to a drop in structural strength and to destruction of the SCHWINGMETALL® mounts within a very short time.

Radiant heat can give rise to high temperatures on the exposed surfaces of elastomer bodies, even at relatively low overall ambient temperatures. The surface can harden if exposed to intense radiant heat for a longer period of time and then crack under dynamic stress.

If SCHWINGMETALL® is used at very low temperatures, the stiffness rises rapidly and the elastomer becomes as hard as glass, in which state it is sensitive to impact stress. The diagram shows the curve for natural rubber (NR) at 50 Shore.

Spring stiffness c	figure 9

Spring rate c versus the temperature for elastomer materials on a natural rubber basis
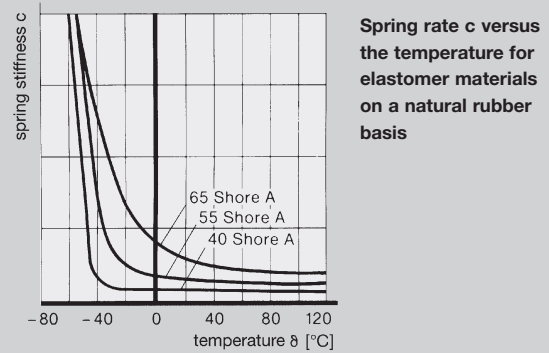
Chemical influences

NR-based elastomer materials are not resistant to sustained exposure to oils, greases and fuels. Occasional and minor exposure does not impair the proper functioning and service life of the materials. If exposed for longer periods of time, SCHWINGMETALL® mounts must be protected by means of casing or covered (see figure 10). The oil-resistance of CR- and NBR-based synthetic elastomers is moderate to high.

Cover panel	figure 10
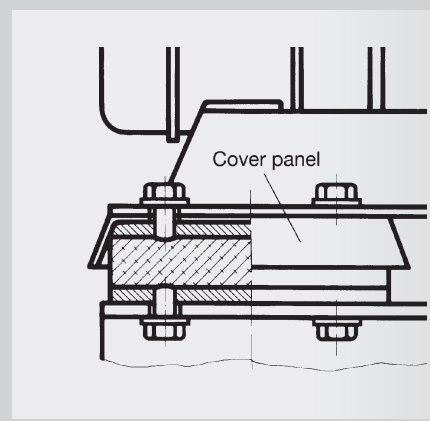
Installation tips

Machining

• Sawing

SCHWINGMETALL® railstrips can be cut to length with the kinds of ribbon or lift saws available commercially. In the case of railstrips with b≤2·h, the pretension force on the sides must be complemented by bracing on top. It is also necessary to lubricate and cool well with a cooling lubricant mixed with water at a ratio of 1:10. Temperatures in excess of 100° C are not permitted.

Burrs are to be removed after sawing. The bonding quality in the edge zones has to be checked. No sharp-edged objects may be used for this purpose.
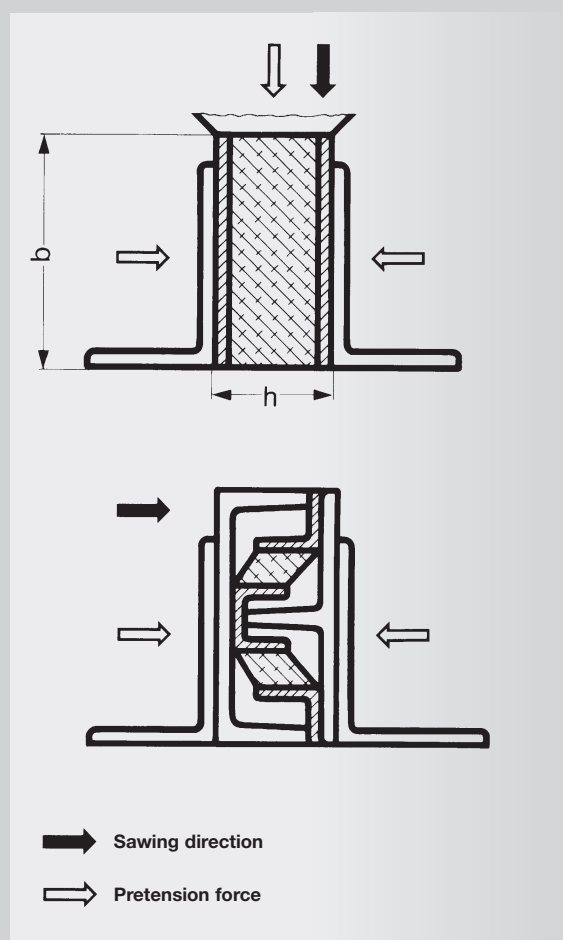
• Boring and threading

Boring and threading can be carried out in the usual manner for metal. The drill is clamped into place on the metal part to prevent it from slipping. If this is not possible, the SCHWINGMETALL® mount should be fixed into place in an appropriate drilling device or with screw clamps. The pretensioning force must be greater than the drilling force.

A deep bit stop is to be used to bore core holes. This ensures that the blind hole thread depth of 15... 20 mm is maintained. A bottoming or plug tap should be used to cut the thread. Lubrication and cooling with an appropriate boring fluid is absolutely essential. Temperatures in excess of 100° C are not permitted.
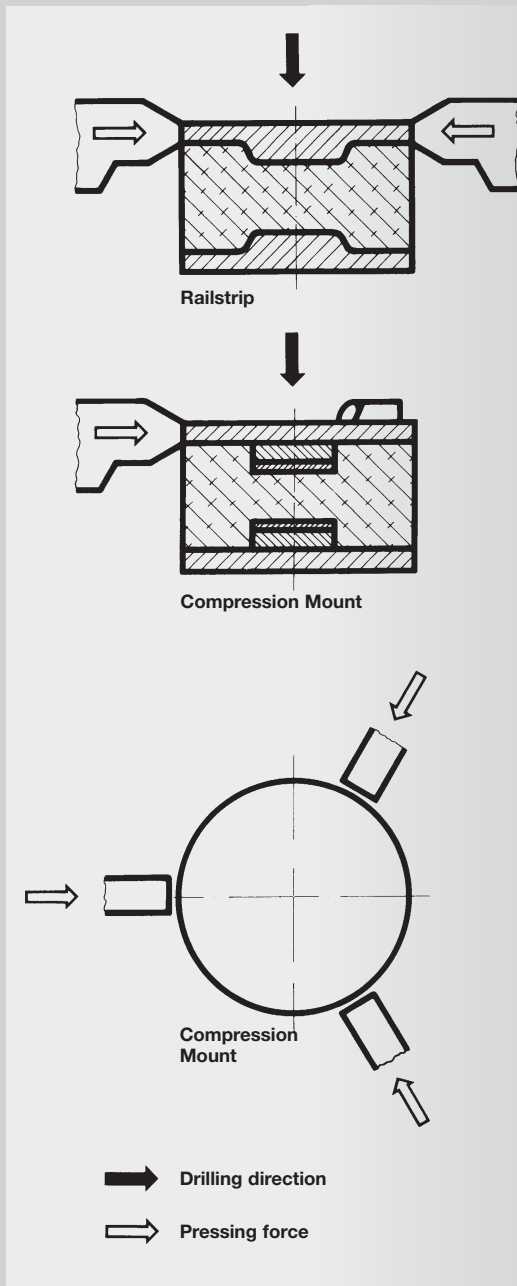
Sawing SCHWINGMETALL® Railstrips	figure 11

➡ Sawing direction

⇨ Pretension force

SCHWINGMETALL® Application

Boring of SCHWINGMETALL® – clamping	figure 12

Railstrip

Compression Mount

Compression Mount

➡ **Drilling direction**

⇨ **Pressing force**

Boring of SCHWINGMETALL® – drilling device	figure 13

Pretension force

Pretension force > drilling force
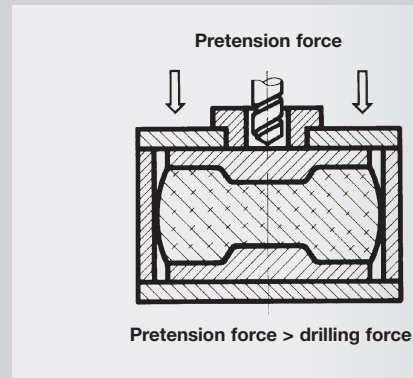
Depth stop is to be used	figure 14

15 … 20 mm
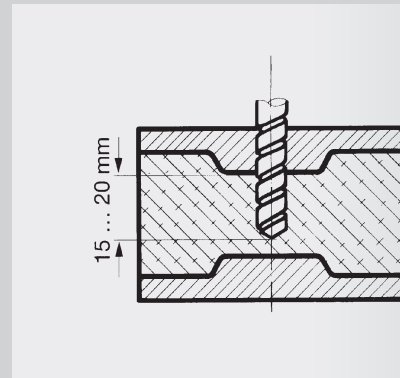
The length of the screws should not exceed the thickness of the metal part. They must not protrude into the spring body.

Installation

Prerequisites

The assembly to be mounted is not rigidly bolted to the base but is positioned on SCHWINGMETALL® mounts that form a cushioned base. The assembly must have sufficient flexural and torsional strength so as to be able to absorb the internal forces without deforming. Otherwise the assembly's internal stiffness must be attained by means of a rigid foundation to which it is permanently attached or by means of an appropriate frame.

The outward convexity of the SCHWINGMETALL® mounts on the side may not be impaired by structural alterations or additions.

Attachment

SCHWINGMETALL® mounts can be bolted to the floor or to the machine on which they are positioned. If the machine mass is sufficiently great and the excitation forces sufficiently low, it is sufficient to attach the SCHWING-METALL® mounts to the machine. SCHWINGMETALL® Dome Mounts with shim matting and SCHWINGMETALL® Compression/Shear mounts of type D and S are ideal for this purpose.

Shims can be used to compensate for floor irregularities.

Attachment bolts may not be allowed to penetrate the SCHWINGMETALL® mount under any circumstances as this would destroy the mount's isolating effect.

Attachment of SCHWINGMETALL® mounts	figure 15

Correct

Wrong
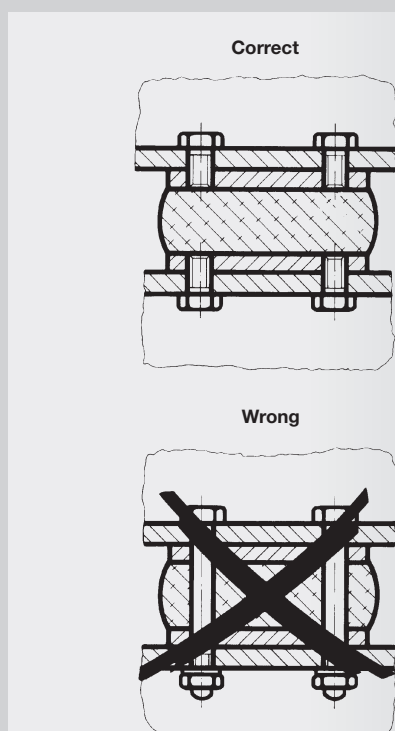
In the event that welding work must be carried out on SCHWINGMETALL® mounts, they must be cooled sufficiently during the work to ensure that neither elastomer nor bonding is exposed to temperatures higher than 100°C.

Example of an installation	figure 16
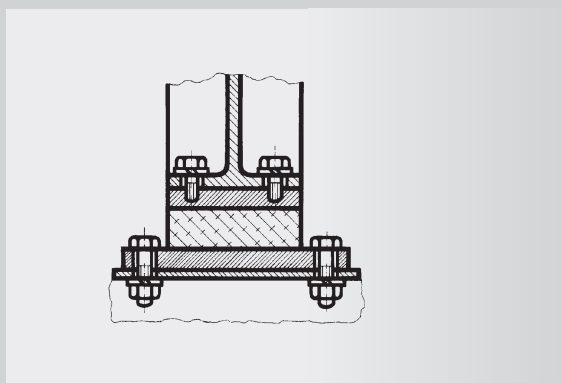
Connections and belt pull

Care is to be taken to prevent rigid metal connections from destroying the isolating effect of the spring elements. Piping, shaft connections and the like must be equipped with sufficiently ductile separators and transition pieces.

External forces not absorbed by mounts - e.g. belt pull - must be intercepted by additional stopper devices.

All spring connections including belt pull and the stopping devices used as buffers have an influence on the tuning of the mounts and must be taken into account in the vibration calculations.

SCHWINGMETALL® Compression/Shear Mounts and Railstrips subject solely to static shear stressing should be slightly predeformed in the direction of the pressure to offset the tensile stress that will occur.

Storage, cleaning

ADIN 7716 contains general rules for the storage, cleaning and servicing of rubber and plastic products.

If necessary SCHWINGMETALL® mounts can be cleaned with a glycerin spirits mixture (1:10). Solvents like benzene or benzole must not be used. Sharp-edged tools are likewise unsuitable for cleaning the mounts.

SCHWINGMETALL® Calculation

The laws of vibration physics must be taken into account in dealing with spring mounts.

To get the most out of SCHWINGMETALL® products, it is necessary to carefully calculate the mounting requirements.

The calculation material contains the necessary formulas and data for designing SCHWINGMETALL® mounts. The material is listed in alphabetical order. All requisite design and calculation data are summarized below.

The calculation examples refer to spring mounts executed with SCHWINGMETALL® products.

Formulas, units and terms		
Formulas	**Units**	**Terms**
a	m/s²	acceleration
a_0	m/s²	input acceleration
a_R	m/s²	net/residual acceleration
$\bar{a}$	–	Acceleration standardized with gravitational acceleration a/g
c	m/s	sound velocity
c	N/mm	spring rate
c_V	Nm/Grad, Nm/rad	torsional spring rate
d	dB	isolation
D	–	Degree of damping, Lehr's damping ratio
D_{rel}	–	relative damping
E	N/mm²	modulus of elasticity
f	Hz	frequency
f_e	Hz	natural frequency
f_{err}	Hz	excitation frequency
F	N, kN	force, impact force
F_{err}	N	excitation force
$F_{ü}$	N	transmitted force
g	9.81 m/s²	acceleration due to gravity
H	Shore A	elastomer hardness
K	–	creep
m	kg	mass
M	Nm	moment
n	–	number (of bearings, time decades)
p	–	impedance leap
R	–	reflected structure-borne sound intensity

Formulas	Units	Terms
s	mm, cm	spring deflection
s_0	mm, m	amplitude
$s_{0\,Stoß}$	mm, m	impact amplitude
s_6	mm	initial deflection after 6 seconds
Δs	mm	increase in spring deflection
t	s	time, load duration
t_0	s	impulse time
T	–	transmission ratio
v	m/s	speed/velocity
v	–	stiffening factor
V	–	dynamic magnifier
W	Nm	energy, work absorption
Z	Pa · s/m	impedance leap
α	° (degree)	angle of torsion
δ	° (degree)	phase angle
η	–	degree of isolation
ϑ	°C	temperature
Λ	–	logarithmic decrement
ν	min^{-1}	vibration frequency
ν_e	min^{-1}	natural vibration frequency
ν_{err}	min^{-1}	excitation vibration frequency
ϱ	g/cm	density
σ	N/mm^2	compressive strain
ψ	–	comparative damping
ω	s^{-1}	radian frequency

SCHWINGMETALL® Calculation

Formula compilation

Term	Formula	Unit
Amplitude s_0 F_{err} in N c in N/m m in kg ω in s^{-1}	$s_0 = \dfrac{F_{err}}{c - m \cdot \omega^2}$	m
Isolation D ν_{err} in min^{-1} ν_e in min^{-1}	$D = 20 \lg \left[\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1 \right]$	dB
Damping – mechanical dissipation factor d	$d = \mathrm{tg}\ \delta$	
Compressive strain σ **for shock load** m in kg g ≈ 9,81 m/s^2 b, l in mm	$\sigma = \dfrac{m_{stat} \cdot \overline{a} \cdot g}{b \cdot l}$	N/mm^2
Natural frequency f_e General c in N/mm m in kg	$f_e = \dfrac{1}{2 \cdot \pi} \cdot \sqrt{\dfrac{c}{m} \cdot 1000}$	Hz
from static spring deflection S_{subA} in cm	$f_e = \dfrac{5}{\sqrt{s_{subA}}}$	Hz
Natural vibration frequency ν_e General c in N/mm m in kg	$\nu_e = \dfrac{30}{\pi} \cdot \sqrt{\dfrac{c}{m} \cdot 1000}$	min^{-1}
from static spring deflection S_{subA} in cm	$\nu_e = \dfrac{300}{\sqrt{s_{subA}}}$	min^{-1}
from the degree of isolation ν_{err} in min^{-1}	$\nu_{e\,erf} = \nu_{err} \cdot \sqrt{\dfrac{1 - \eta}{2 - \eta}}$	min^{-1}
Natural vibration frequency for shock isolation with half-sine excitation t_0 in s	$\nu_{e\,erf} = \dfrac{15 \cdot \overline{a}_{\ zul}}{\overline{a}_0 \cdot t_0}$	min^{-1}
if v is known g in 9,81 m/s^2 v in m/s	$\nu_{e\,erf} = \dfrac{15 \cdot g \cdot \overline{a}_{\ zul}}{v}$	min^{-1}
with rectangular excitation t_0 in s	$\nu_{e\,erf} = \dfrac{30 \cdot \overline{a}_{\ zul}}{\pi \cdot a_0 \cdot t_0}$	min^{-1}
if v is known g ≈ 9,81 m/s^2 v in m/s	$\nu_{e\,erf} = \dfrac{30 \cdot g \cdot \overline{a}_{\ zul}}{\pi \cdot v}$	min^{-1}

Term	Formula	Unit
Spring rate c of natural vibration frequency v_e in min^{-1} m in kg	$c = \left(\dfrac{v_e \cdot \pi}{30}\right)^2 \cdot m$	N/m
Deflection increase Δ s s_6 in mm	$\Delta s = K \cdot s_6 \cdot n$	mm
Impedance Z E in N/mm^2 ϱ in g/cm^3 c in m/s	$Z_\infty = \sqrt{E \cdot \varrho \cdot 10^9} = c \cdot \varrho \cdot 10^3$	Pa · s/m
Impedance leap p	$p = \dfrac{Z_1}{Z_2} = \sqrt{\dfrac{E_1 \cdot \varrho_1}{E_2 \cdot \varrho_2}} = \dfrac{c_1 \cdot \varrho_1}{c_2 \cdot \varrho_2}$	
Degree of isolation η v_{err} in min^{-1} v_e in min^{-1}	$\eta = 1 - \dfrac{1}{\left(\dfrac{v_{err}}{v_e}\right)^2 - 1}$	
Creep value K Δ s in mm s_6 in mm	$K = \dfrac{\Delta s}{s_6 \cdot n}$	
Reflected structure-borne sound intensity R	$R = \dfrac{(p-1)^2}{(p+1)^2}$	
Residual (net) acceleration a_R for shock isolation with half-sine excitation v_e in min^{-1} t_0 in s	$a_R = g \cdot \sqrt{\left(\dfrac{v_e \cdot \overline{a}_0 \cdot t_0}{15}\right)^2 + 1}$	m/s^2
if v is known v_e in min^{-1} v in m/s g ≈ 9,81 m/s^2	$a_R = g \cdot \sqrt{\left(\dfrac{v_e \cdot v}{15 \cdot g}\right)^2 + 1}$	m/s^2
with rectangular excitation v_e in min^{-1} t_0^2 in s	$a_R = g \cdot \sqrt{\left(\dfrac{\pi \cdot v_e \cdot \overline{a}_0 \cdot t_0}{30}\right)^2 + 1}$	m/s^2
if v is known v_e in min^{-1} v in m/s g ≈ 9,81 m/s^2	$a_R = g \cdot \sqrt{\left(\dfrac{\pi \cdot v_e \cdot v}{30 \cdot g}\right)^2 + 1}$	m/s^2
Transmitted force $F_ü$ F_{err} in N v_{err} in min^{-1} v_e in min^{-1}	$F_ü = \dfrac{F_{err}}{\left(\dfrac{v_{err}}{v_e}\right)^2 - 1}$	N

SCHWINGMETALL® Examples of calculations

Calculation, mode of proceeding

The approach taken in designing a SCHWINGMETALL® mount depends on the tasks that are to be fulfilled.

The same natural frequency should always be attained at all mounting points of a mounted mass. It is only in this case that the calculated natural frequency is also the frequency of the system in a vertical direction. Otherwise the natural frequencies of the spring-mass system are interlinked, in which case the simplifications made here monovariantly for an oscillator are no longer correct.

The natural frequencies are derived from the mass at the mounting point and the spring stiffness of the SCHWING-METALL® mount used there.

Equal natural frequencies can be attained most easily if the mounting points are distributed in such a way that they all bear the same weight, in which case the same mounts can be used everywhere.

If this is not possible the SCHWINGMETALL® mounts shall have to be selected in such a way that the distribution of mass to the various mounting points yields the same natural frequency. SCHWINGMETALL® Railstrips are just right in this case because they can be cut to lengths that provide the requisite spring stiffness.

Vibration isolation
(active or passive)

The mass – or the weight at the various mounting points – that is to be isolated and the excitation frequency is known. It is of no concern whether the oscillator is positioned on this mass and the surroundings are to be protected from it (active) or whether, conversely, sensitive equipment is to be isolated from excitation emanating from the floor (passive).

A degree of isolation η, conforming to the requirements, is specified. It is the basis for the calculation of the requisite natural frequency. The degree of isolation is attained when the system is tuned to this natural frequency. At higher frequencies the degree of isolation drops, at lower frequencies it rises.

The spring stiffness required – and thus the static compression as well – can be worked out once the natural frequency has been calculated and the load per mounting point is known. The appropriate mounts must now be selected and the calculation is verified with the mounts selected.
The program executes all the calculation steps and shows the results.

Shock isolation

The mass (or the weight at the various mounting points) that must be protected from shocks and the acceleration, time and shape (rectangular, triangular or half-sine) of the shock is known.

The net acceleration that can be supported by the mass is specified. It allows for calculation of the requisite natural frequency. Net accelerations of the defined magnitude occur with the specified shock when the system is tuned to this natural frequency. At higher natural frequencies the net accelerations rise, at lower natural frequencies the net accelerations drop.

The spring stiffness required can be worked out on the basis of the natural frequency calculated and the know static load per mounting point. The appropriate mounts must now be selected and verified with the mounts selected and the calculation.
The program carries out all steps in the calculation and reports the results

Inspection of a mount
(SCHWINGMETALL® Mounts have already been selected).

With the mass and the mounts known, the system's vibrational behavior is now to be selected. In particular following conclusion of the design work for shock isolation, it is advisable to review the natural frequency and static compression.
The load at the mounting point and the mount selected are also specified. On this basis the program calculates static compression and natural frequency.
If an excitation frequency has been entered, the degree of isolation can be worked out as well.

SCHWINGMETALL® mounts – active interference suppression
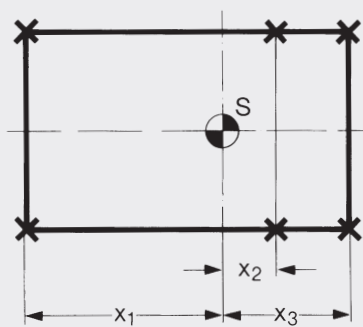
A motor generation unit is to be resiliently mounted on a joint steel frame-work. (active interference suppression).

Weight	$m = 600$ kg
Excitation vibrator frequency (service-speed range)	$\nu_{err} = 1500$ min^{-1}
Number of supports	$n = 6$
Loading of supports evenly	$m_{1...6} = 100$ kg
Required degree of isolation	$\eta > 0,85$

Arrangement of mounts

Distances between mounts

$x_1 = 900$ mm; $x_3 = 750$ mm
$x_2 = ?$
$\Sigma\, x_{(S)} = 0 = x_1 + x_2 + x_3$

$0 = -900 + x_2 + 750$
$x_2 = 150$ mm

Required natural vibration frequency

from $\eta = 1 - \dfrac{1}{\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1}$

for $\eta > 0,85$

$\nu_{e\ erf} \leqq \nu_{err} \cdot \sqrt{\dfrac{1-\eta}{2-\eta}} = 542$ min^{-1}

Required spring stiffness

for $c = \left(\dfrac{\nu_e \cdot \pi}{30}\right)^2 \dfrac{m_{1...6}}{1000}$

$c \leq 322\ \dfrac{N}{mm}$

Determination of the SCHWINGMETALL® elements

Tables on page 18

SCHWINGMETALL® mounts, Article No. 3913219000
Ø 50 mm, 45 mm high, Mould No. 27797/C,
55 Shore A, spring stiffness $c_z = 228$ N/mm,
max. load $F_z = 1300$ N

SCHWINGMETALL® mounts of various sizes and dimensions
are suitable for a wide range of applications. Mounts of Ø 50 mm,
45 mm high should be selected if the $m_{1...6} = 100$ kg per support
point at the required natural vibration frequency $\nu_e \leq 542$ min^{-1}
are to be supported.

Result

SCHWINGMETALL® mount type C
50 mm, 45 mm high, 55 Shore A
Mould No. 27 797/C
6 pieces

SCHWINGMETALL® Examples of calculations

Checking the natural frequency

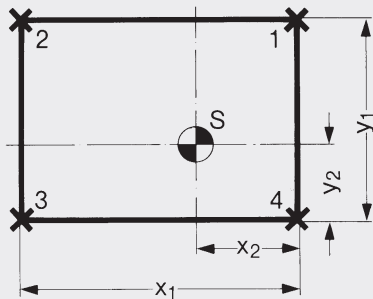for $\nu_e = \dfrac{30}{\pi} \cdot \sqrt{\dfrac{c}{m_{1\ldots6}}} \cdot 1000$

$\nu_e \leq 456 \text{ min}^{-1}$

Checking the degree of isolation

$\eta = 1 - \dfrac{1}{\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1}$

$\eta = 0{,}89 > 0{,}85$

SCHWINGMETALL® rail strips asymmetrical position of centre of gravity

Arrangement of mounts

A cooling unit on a bending-resistant frame is to be set up isolated from vibrations (active interference suppression).

Weight	m = 1500 kg
Excitation vibration frequency (service-speed range)	ν_{err} = 1200 min⁻¹
Number of supports	n = 4
Distance between supports	x_1 = 1600 mm x_2 = 700 mm y_1 = 900 mm y_2 = 400 mm
Required degree of isolation	$\eta > 0{,}85$

Loads

$$m_1 = m \cdot \frac{(x_1 - x_2) \cdot y_2}{x_1 \cdot y_1} = 375 \text{ kg}$$

$$m_2 = m \cdot \frac{x_2 \cdot y_2}{x_1 \cdot y_1} = 292 \text{ kg}$$

$$m_3 = m \cdot \frac{x_2 \cdot (y_1 - y_2)}{x_1 \cdot y_1} = 365 \text{ kg}$$

$$m_4 = m \cdot \frac{(x_1 - x_2) \cdot (y_1 - y_2)}{x_1 \cdot y_1} = 468 \text{ kg}$$

Required natural vibration frequency

from $\eta = 1 - \dfrac{1}{\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1}$

for $\eta > 0{,}85$

$$\nu_{e\,erf} \leqq \nu_{err} \cdot \sqrt{\frac{1-\eta}{2-\eta}} = 433 \text{ min}^{-1}$$

**Determination of
SCHWINGMETALL® elements**

Tables on page 24

SCHWINGMETALL® rail strip type 1, Article No. 394208000,
50 mm wide, 70 mm high, 55 Shore A, Mould No. 25080

SCHWINGMETALL® rail strips can be cut to lengths appropriate for
the respective loads. So they are very suitable in cases where the
supporting points have been fixed and different masses are to be
supported. The rail height h = 70 mm is derived from the necessary
natural vibration frequency $v_e \leq 433$ min^{-1} for the length-specific
spring stiffness c_Z = 38 N/mm and the max. load F_Z = 250 N

Total length required

$$l_{ges} = \frac{m \cdot g}{F_z}$$

$$l_{ges} = \frac{1500 \cdot 9{,}81}{250} = 600 \text{ mm}$$

Individual lengths

$$l_{1...4} = \frac{m_{1...4} \cdot g}{F_z}$$

l_1 = 150 mm; l_2 = 117 mm
l_3 = 145 mm; l_4 = 188 mm

Result

**SCHWINGMETALL® rail strip type 1
Article No. 394208000, Mould No. 25080
50 mm wide, 70 mm high, 55 Shore A
117, 145, 150, 188 mm long**

Checking the natural frequency

$$\text{for } v_e = \frac{30}{\pi} \cdot \sqrt{\frac{c}{m} \cdot 1000}$$

v_{eZ} = 372 min^{-1}

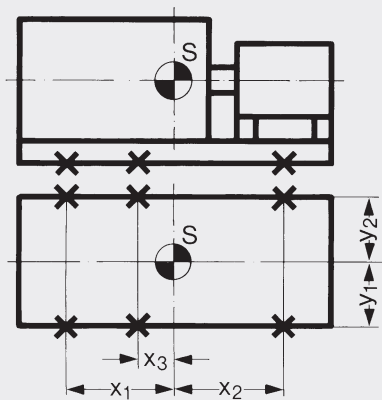$v_{eX,Y}$ = 191 min^{-1}

Checking of the degree of isolation

$$\eta = 1 - \frac{1}{\left(\dfrac{v_{err}}{v_e}\right)^2 - 1}$$

η_H = 0,88 > 0,85
$\eta_{Q,L}$ = 0,98

SCHWINGMETALL® Examples of calculations

SCHWINGMETALL® Combi mount – isolation of shock

Arrangement of mounts

A motor generator unit should be made shockproof and vibration isolated. The requirement is to keep it shockproof according to control class 1.6/16 (cf. "Official texts - Structural civil defence - 2nd edition, for the year 1982").

Weight	$m = 6000$ kg
Excitation vibration frequency (service-speed range)	$\nu_{err} = 1500$ min^{-1}
Number of supports	$n = 6$
Even loading of supports	$m_{1 \dots 6} = 1000$ kg
Required degree of isolation	$\eta > 0{,}85$
Permitted residual acceleration	$a_{Rzul} = 9$ g m/s^2

Distances between mounts

$x_1 = -550$ mm; $x_2 = 720$ mm
$x_3 = ?$
$\Sigma \, x_{(S)} = 0 = x_1 + x_2 + x_3$

$0 = -550 + 720 + x_3$

$x_3 = -170$ mm

Required natural vibration frequency

for control class 1.6/16

$$\nu_{e \, erf} = \frac{30 \cdot g}{\pi \cdot v} \cdot \sqrt{\overline{a}^2{}_{zul} - 1}$$

$v = 1{,}6$ m/s   Acc. to control class

$$\nu_{e \, erf} = \frac{30 \cdot 9{,}81}{\pi \cdot 1{,}6} \cdot \sqrt{9^2 - 1} = 524 \text{ min}^{-1}$$

Required spring stiffness

for $c = \left(\dfrac{\nu_e \cdot \pi}{30} \right)^2 \dfrac{m_{1 \dots 6}}{1000}$

$c \leq 3011 \, \dfrac{N}{mm}$

Determination of SCHWINGMETALL® elements

Table on page 54-55

Table 3 on page 88

SCHWINGMETALL® Combi elements with rail strips 150 mm wide, 100 mm high, 338 mm long, 55 Shore A, Mould No. 58394, spring stiffness $c_z = 2694$, max. load $F_Z = 17000$

SCHWINGMETALL® Combi elements particularly suitable to reduce impact accelerations, as they show linear spring characteristics even when subjected to shock loads up to the permitted limits. To ensure that SCHWINGMETALL® Combi elements are not stressed beyond the permitted impact load limits, they should only be statically stressed with less than 40 % of their permitted static load. Combi elements with rail strips 150 mm wide, 100 mm high, 338 mm long are suitable for a stressing of $m_{1 \dots 6} = 1000$ kg on the support points at the required natural vibration frequeny $\nu_e \leq 524$ min^{-1}.

Checking the natural frequency

$$\text{for } \nu_e = \frac{30}{\pi} \cdot \sqrt{\frac{c}{m} \cdot 1000}$$

$\nu_e = 496 \text{ min}^{-1}$

Result

SCHWINGMETALL® Combi elements with rail strip
150 mm wide, 100 mm high, 338 mm long, 55 Shore A
Mould No. 58394
6 pieces (long type)

Check of the residual acceleration

$$a_R = g \cdot \sqrt{\left(\frac{\pi \cdot \nu_e \cdot v}{30 \cdot g}\right)^2 + 1}$$

$$a_R = g \cdot \sqrt{\left(\frac{\pi \cdot 496 \cdot 1,6}{30 \cdot 9,81}\right)^2 + 1} = 8,53 \text{ g} < 9 \text{ g m/s}^2$$

Determination of the max. impact amplitude in vertical direction

$$s_{0Stoß} = (\bar{a} - 1) \cdot g \left(\frac{30}{\pi \cdot \nu_e}\right)^2$$

$$s_{0Stoß} = (8,53 - 1) \cdot 9,81 \left(\frac{30}{\pi \cdot 496}\right)^2 = 0,027 \text{ m}$$

All connections, e.g. fuel and emission lines, must be designed to be so flexible that they can compensate for deflections of ± 27 mm without being damaged.

Checking of the impact load

$$\sigma = \frac{m_{stat} \cdot \bar{a} \cdot g}{a_3 \cdot l_2}$$

$a_3 = 150 \text{ mm}$
$l_2 = 338 \text{ mm}$

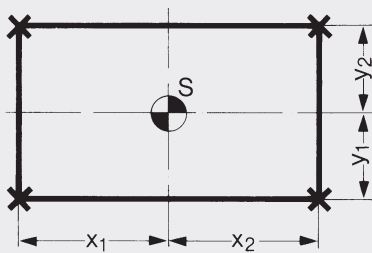$$\sigma = \frac{1000 \cdot 8,53 \cdot 9,81}{150 \cdot 338} = 1,65 < 2 \text{ N/mm}^2$$

Checking of the degree of isolation

$$\eta = 1 - \frac{1}{\left(\frac{\nu_{err}}{\nu_e}\right)^2 - 1}$$

$$\eta = 1 - \frac{1}{\left(\frac{1500}{496}\right)^2 - 1} = 0,88 > 0,85$$

SCHWINGMETALL® Examples of calculations

SCHWINGMETALL® cone element – Passive interference suppression

Arrangement of mounts

A measuring instrument is to be isolated from vibrations in a building, to avoid erroneous readings of weighing machine (passive interference suppression).

Weight	$m = 50$ kg
Excitation vibration frequency of ceiling	$\nu_{err} = 1150$ min^{-1}
Number of supports	$n = 4$
Distances between supports	$x_1 = x_2$
Symmetrically arranged to centre of gravity	$y_1 = y_2$
Required degree of isolation	$\eta > 0{,}75$

Loads

$$m_{1\ldots4} = \frac{m}{n}$$

$$m_{1\ldots4} = \frac{50}{4} = 12{,}5 \text{ kg}$$

Required natural vibration frequency

from $\eta = 1 - \dfrac{1}{\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1}$

for $\eta > 0{,}75$

$$\nu_{e\ erf} \leqq \nu_{err} \cdot \sqrt{\frac{1-\eta}{2-\eta}} = 514 \text{ min}^{-1}$$

Required spring stiffness

for $c = \left(\dfrac{\nu_e \cdot \pi}{30}\right)^2 \dfrac{m}{1000}$

$$c \leq 36{,}2 \ \frac{\text{N}}{\text{mm}}$$

Determination of SCHWINGMETALL® elements

Table on page 66

SCHWINGMETALL® instrumental mounts, Article No. 3956201000, 55 Shore A, Mould No. 27860, spring stiffness 54 N/mm and max. load 200 N

SCHWINGMETALL® instrumental mounts are ideal for the support of measuring instruments. They are very soft and allow a certain amount of adjustment. The spring characteristics are the same in all directions.

Check the natural frequency

for $\nu_e = \dfrac{30}{\pi} \cdot \sqrt{\dfrac{c}{m} \cdot 1000}$

$\nu_{eX,Y,Z} = 627 \text{ min}^{-1} > 514 \text{ min}^{-1}$

with $m_{1...4} = 12{,}5$ kg

Requirements not met

To attain the required natural vibration frequency $\nu_e \leq 514$ min-1, the mass must be increased for the individual support points to $m_{1...4} = 20$ kg by adding an extra mass (steel, concrete).

Natural frequency

for $m_{1...4} = 20$ kg

$\nu_{e\,H,Q} = 496 \text{ min}^{-1} < 514 \text{ min}^{-1}$

Result

SCHWINGMETALL® instrumental mounts
Article No. 3956201000, Mould No. 27860
55 Shore A
4 pieces

Checking of the degree of isolation

$\eta = 1 - \dfrac{1}{\left(\dfrac{\nu_{err}}{\nu_e}\right)^2 - 1}$

$\eta = 0{,}77 \geq 0{,}75$
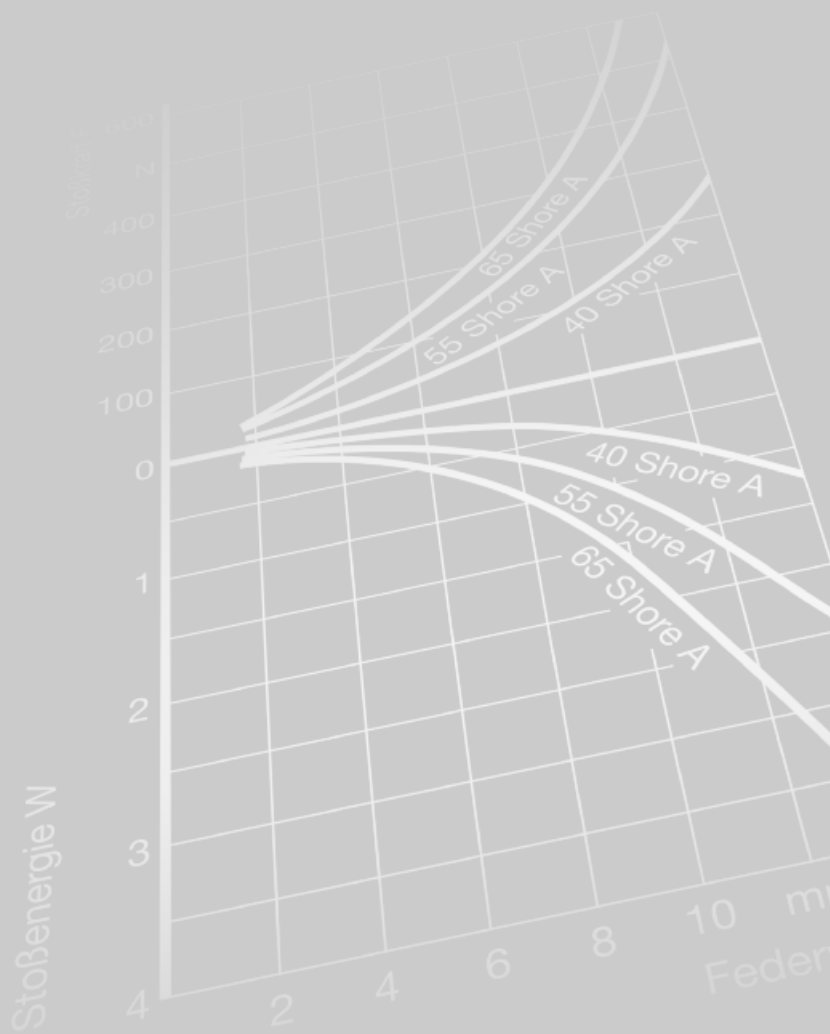
www.contitech-online.com
www.contitech.de/vibrationcontrol
www.schwingmetall.com

Vibration Control

Market segment
Vibration Control Industry

Contact
ContiTech Vibration Control GmbH
Development
Phone +49 (0)511 976-6846
Fax   +49 (0)511 976-6860
entwicklung.industrietechnik@
vc.contitech.de

Sales Hannover
Postfach 210469
D-30404 Hannover
Jädekamp 30
D-30419 Hannover
Phone +49 (0)511 976-6776
Fax   +49 (0)511 976-6098
vertrieb.industrietechnik@
vc.contitech.de

Sales Hamburg
Hannoversche Strasse 88
D-21079 Hamburg
Phone +49 (0)40 7667-2895
Fax   +49 (0)40 7667-2410

Your local contact:
▸ www.contitech.de/contactlocator

The ContiTech division
of the Continental Corporation
is a development partner and
original equipment supplier
to numerous industries for
high-quality functional parts,
components and systems.
With its know-how in rubber
and plastics technology,
ContiTech contributes signifi-
cantly to industrial progress
and mobility that is safe,
comfortable and eco-friendly.

Certified in accordance with

TÜV CERT VDA 6.1 041 018005	TÜV CERT QS-9000 041 018005	TÜV CERT EN ISO 9001 041 018005	Umweltmanagementsystem Dr. Kühnemann Institut und Partner für Umwelttechnik Zertifiziert nach DIN EN ISO 14001 Reg.-Nr. 00-9053-05-01
VDA 6.1	QS-9000	EN ISO 9001	EN ISO 14001

Continental ☉
CONTITECH