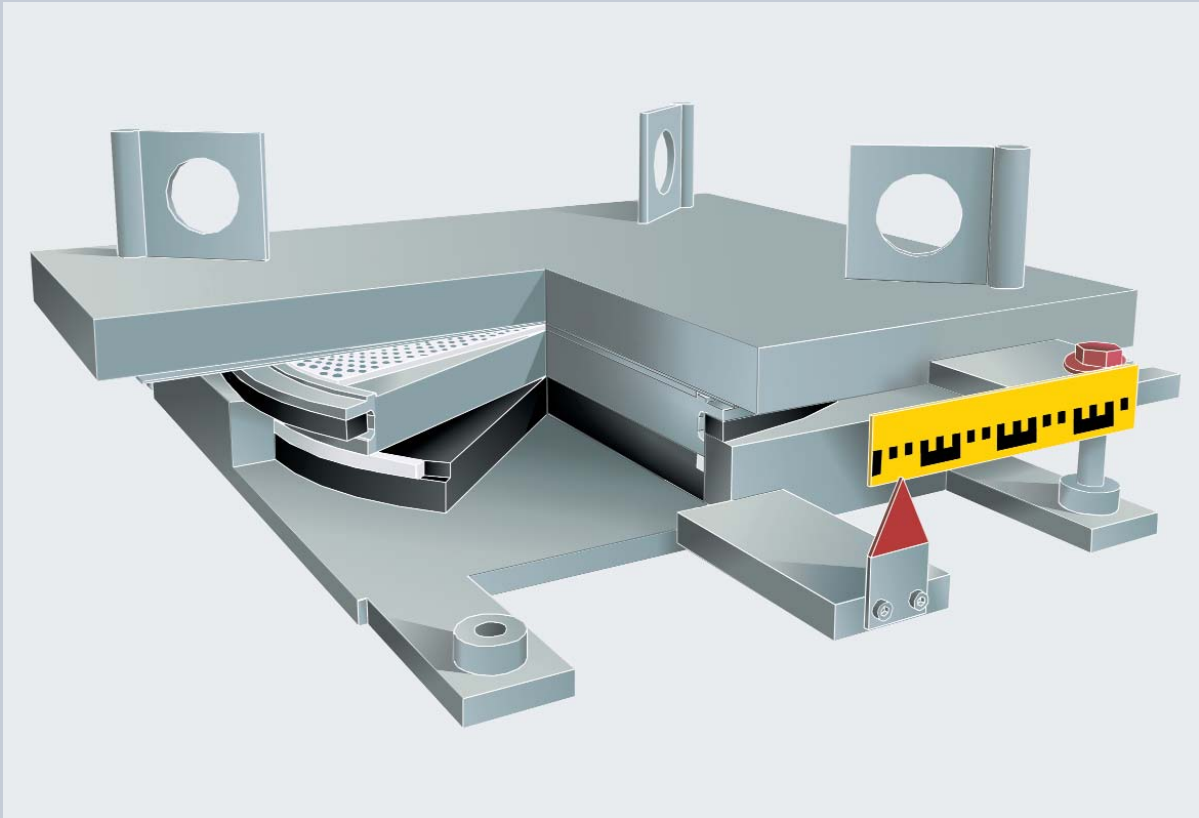
Structural Protection Systems

MAURER Pot Bearings

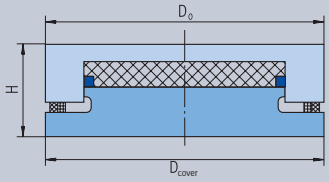


Technical information, dimensions and weights

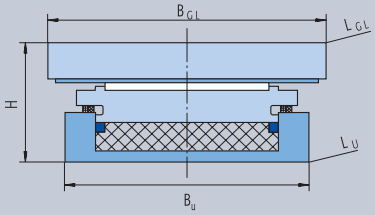
MAURER SÖHNE
Innovations in steel

Since 1876

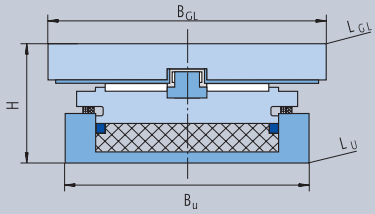
Design



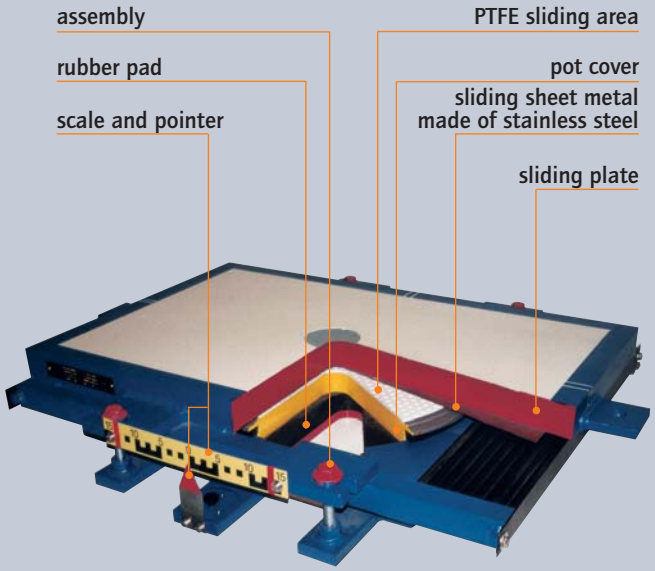
Fixed pot bearing *TF*



Generally mobile pot bearing *TGa*



Unilaterally mobile pot bearing *TGe*



Generally mobile pot bearing *TGa*

Function

The construction principle of a pot bearing corresponds to a fixed bearing and thus allows rotations around any horizontal axis (point tilting) by shear deformation of an elastomer pad included in a steel pot. The used elastomer keeps its volume constant under allround compressions and thus is incompressible (no sinking under load).

By providing a sliding plate a fixed bearing becomes a generally mobile one and/or by additional attachment of a guide stop a unidirectional mobile pot sliding bearing.

The bearing pot is machined either from one piece or formed by welding a pot ring to the pot base. The elastomer pad inserted into the pot is secured against pressing out from the annular gap, located between pot cover and pot ring, by means of a pressure seal. The pot is closed by a cover, which meshes to the pot and adapts to the elastomer plate. In case of a fixed bearing it is usually fitted below and transfers the loads directly into the substructure.

For the pot sliding bearing another sliding plate is attached to and usually above the cover.

Therefore a PTFE disc is inserted into the top of the pot cover. To increase its loadbearing capacity, and as for the spherical bearing it is enclosed into the steel approximately to half of its thickness. The sliding plate provided with an austenitic chrome-nickel-alloyed steel sheet slides upon it.

The PTFE discs are provided with recesses (lubrication bore reliefs), which serve for storing a special lubricant to guarantee a permanent lubrication of the sliding surfaces. To achieve small coefficients of friction the austenitic sliding surface is finished with smallest surface roughness.

Due to the allround embedding of the elastomer pad the characteristics of the rubber, which is ideal for bearing constructions, are suitable for high and very high loads. A vital point is the functionability of the seal. The patented PTFE/carbon seal used by Maurer Söhne is suitable even for larger imposed load rotations which occur with steel and railway bridges. The twisting of the bearing is rendered possible by an elastic shear deformation within the pad. Due to the resulting strain, which depends on the size of rotation, the permissible angle of rotation must be limited. With increasing rotation the restoring moment rises. Larger angles of rotation require additional constructive measures when sealing the annular gap. The pot's dimensions in the layout result from the permissible compressions in the elastomer and the adjacent components.

Fixed pot bearing TF

The very simply constructed fixed bearing, which consists only of pot, elastomer pad and pot cover, transfers horizontal forces in both axis directions actuated by adherence by contact between cover and ring. The steel/steel friction, arising in the contact area, must be considered on determination of torsional restraint.

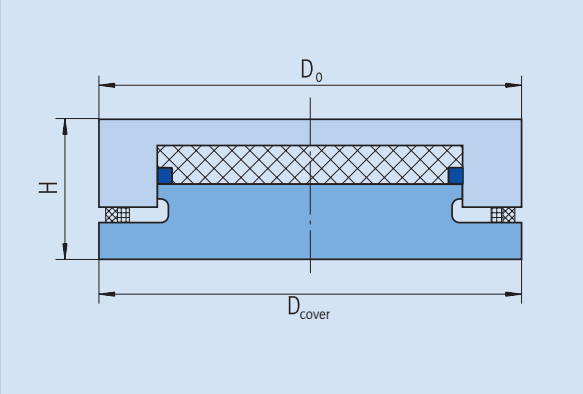
Generally mobile pot bearing TGa

Displacements in x- and y-direction are permitted. No absorption of outside horizontal forces.

Unilaterally mobile pot bearing TGe

This bearing is locked in one axis direction by a guide stop and thus can absorb horizontal forces rectangularly to the guide stop. The guide stop transfers the horizontal forces from the sliding plate into the pot cover, where they will be transferred by contact into the pot ring actuated by adherence. The elastomer pad is not used for deducing horizontal loads. Friction restraints in the contact area between guide stop and sliding plate are kept small by suitable sliding parts. Instead of one axially arranged guide stop two lateral guide stops can be provided.

Fixed pot bearing *TF*
Dimensions and weights acc. to German approval



Stura di Demonte viaduct, Italy

Permissible concrete pressure = 26 N/mm²					
type of bearing	load V kN	H mm	D_{cover} mm	D_o mm	weight kg
TF - 1	1000	70	270	270	36
TF - 2	2000	80	360	360	62
TF - 3	3000	90	430	430	93
TF - 4	4000	94	490	490	119
TF - 5	5000	101	550	550	155
TF - 6	6000	106	600	600	192
TF - 7	7000	112	650	650	235
TF - 8	8000	116	690	690	269
TF - 9	9000	124	730	730	322
TF - 10	10000	131	770	770	380
TF - 11	11000	135	810	810	427
TF - 12	12000	139	840	840	468
TF - 13	13000	145	880	880	544
TF - 14	14000	150	910	910	598
TF - 15	15000	155	940	940	654
TF - 16	16000	158	970	970	714
TF - 17	17000	161	1000	1000	768
TF - 18	18000	168	1030	1030	856
TF - 19	19000	170	1060	1060	913
TF - 20	20000	175	1090	1090	994
TF - 22	22000	183	1140	1140	1127
TF - 24	24000	190	1190	1190	1277
TF - 26	26000	198	1240	1240	1449
TF - 28	28000	203	1280	1280	1570
TF - 30	30000	210	1330	1330	1754

The table is based on a permissible compression of σ exz. = 26 N/mm². We supposed normal conditions min. V = 0.5 · max. V and a horizontal force H_{Res} = 0.1 · max. V. Angular rotation tan $\varphi = \pm$ 0.01.

Dimensions and weights for deviating permissible concrete pressures and unusual load conditions will be calculated on request.

Depending on the area of application and country requirements MAURER pot bearings can be supplied in accordance with various standards, e.g. EN 1337, DIN 4141, BS5400, AASHTO, SETRA etc.

Note:
Possibly necessary anchorage devices require additional space and are not considered within this table.

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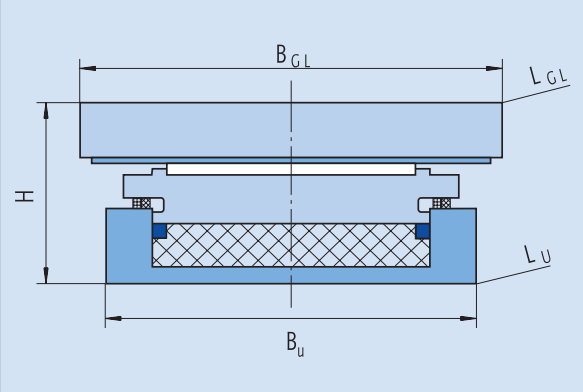
Generally mobile pot bearing *TGa*
Dimensions and weights acc. to German approval



Twistetalbrücke, BAB A44 Kassel – Dortmund, Germany

Permissible concrete pressure = 26 N/mm²										
type of bearing	load V kN	H mm	B_u L_u mm	B_{GL} mm	ex = ±50 mm L_{GL} mm	ex = ±50 mm weight kg	ex = ±100 mm L_{GL} mm	ex = ±100 mm weight kg	ex = ±150 mm L_{GL} mm	ex = ±150 mm weight kg
TGa - 1	1000	100	270	320	440	85	555	96	670	106
TGa - 2	2000	107	360	410	530	130	645	143	760	156
TGa - 3	3000	113	420	470	590	168	705	186	820	204
TGa - 4	4000	120	480	530	650	212	765	238	880	264
TGa - 5	5000	129	530	580	700	264	815	296	930	328
TGa - 6	6000	133	570	620	740	308	855	344	970	380
TGa - 7	7000	138	610	660	780	358	895	399	1010	439
TGa - 8	8000	144	650	700	820	414	935	462	1050	509
TGa - 9	9000	151	680	740	850	476	965	525	1080	574
TGa - 10	10000	156	710	770	880	532	995	586	1110	639
TGa - 11	11000	162	750	810	920	615	1035	673	1150	731
TGa - 12	12000	174	790	850	960	725	1075	789	1190	852
TGa - 13	13000	175	810	880	980	768	1095	835	1210	902
TGa - 14	14000	182	840	910	1010	847	1125	922	1240	997
TGa - 15	15000	188	870	940	1040	940	1155	1015	1270	1090
TGa - 16	16000	190	900	970	1070	1008	1185	1093	1300	1177
TGa - 17	17000	195	930	1000	1100	1108	1215	1193	1330	1277
TGa - 18	18000	199	950	1030	1120	1174	1235	1262	1350	1350
TGa - 19	19000	204	980	1060	1150	1280	1265	1374	1380	1467
TGa - 20	20000	208	1010	1080	1180	1374	1295	1471	1410	1568
TGa - 22	22000	219	1060	1130	1230	1586	1345	1692	1460	1798
TGa - 24	24000	224	1100	1180	1270	1746	1385	1860	1500	1973
TGa - 26	26000	231	1150	1230	1320	1963	1435	2086	1550	2208
TGa - 28	28000	240	1190	1270	1360	2180	1475	2311	1590	2442
TGa - 30	30000	246	1230	1320	1420	2400	1545	2549	1670	2698

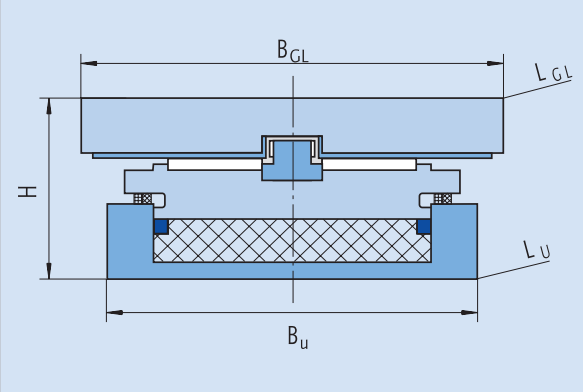
The pot bearing's dimensions are determined by the permissible compressions in the elastomer pad, larger permissible concrete compressions do not result in smaller bearing dimensions, therefore the tables are only based on the value σ exz. = 26 N/mm².
We supposed normal conditions min. V = 0.5 · max. V. An angular rotation tan $\varphi = \pm 0.01$ as well as a lateral displacement e_y acc. to DIN 4141 of at least ± 20 mm have been assumed.

Dimensions and weights for deviating permissible concrete pressures and unusual load conditions will be calculated on request.

Depending on the area of application and country requirements MAURER pot bearings can be supplied in accordance with various standards, e.g. EN 1337, DIN 4141, BS5400, AASHTO, SETRA etc.

Note:
Possibly necessary anchorage devices require additional space and are not considered within this table.

Unilaterally mobile pot bearing *TGe* - 26 N/mm²
Dimensions and weights acc. to German approval



Vasco da Gama Bridge, Portugal

Permissible concrete pressure = 26 N/mm²										
type of bearing	load V kN	H mm	B_u L_u mm	B_{GL} mm	ex = ±50 mm		ex = ±100 mm		ex = ±150 mm	
					L_{GL} mm	weight kg	L_{GL} mm	weight kg	L_{GL} mm	weight kg
TGe - 1	1000	117	270	330	440	118	555	134	670	150
TGe - 2	2000	123	360	420	530	167	645	186	760	204
TGe - 3	3000	129	420	480	590	213	705	237	820	261
TGe - 4	4000	136	490	550	660	292	775	316	890	339
TGe - 5	5000	145	550	610	720	363	835	404	950	445
TGe - 6	6000	149	590	650	760	421	875	460	990	499
TGe - 7	7000	156	640	700	810	491	925	539	1040	586
TGe - 8	8000	162	690	750	860	576	975	629	1090	681
TGe - 9	9000	169	720	780	890	639	1005	698	1120	757
TGe - 10	10000	175	760	820	930	732	1045	796	1160	859
TGe - 11	11000	180	800	860	970	823	1085	892	1200	961
TGe - 12	12000	186	840	900	1010	930	1125	1000	1240	1069
TGe - 13	13000	188	860	920	1030	977	1145	1054	1260	1130
TGe - 14	14000	195	900	960	1070	1102	1185	1179	1300	1256
TGe - 15	15000	201	930	990	1100	1205	1215	1287	1330	1369
TGe - 16	16000	203	960	1020	1130	1299	1245	1386	1360	1472
TGe - 17	17000	209	990	1050	1160	1408	1275	1505	1390	1601
TGe - 18	18000	217	1020	1080	1190	1562	1305	1659	1420	1755
TGe - 19	19000	222	1050	1110	1220	1680	1335	1787	1450	1894
TGe - 20	20000	226	1070	1130	1240	1766	1355	1877	1470	1988
TGe - 22	22000	236	1130	1190	1300	2049	1415	2164	1530	2278
TGe - 24	24000	243	1180	1240	1350	2289	1465	2420	1580	2551
TGe - 26	26000	250	1220	1280	1410	2536	1535	2677	1660	2817
TGe - 28	28000	263	1270	1330	1460	2919	1585	3072	1710	3224
TGe - 30	30000	270	1320	1380	1510	3212	1635	3374	1760	3535

The table is based on a permissible pressure of σ exz. = 26 N/mm². We supposed normal conditions min. V = 0.5 · max. V and a horizontal force in lateral direction of H_y = 0.1 · max. V. Angular rotation tan φ = ± 0.01.

Dimensions and weights for deviating permissible concrete pressures and unusual load conditions will be calculated on request.

Depending on the area of application and country requirements MAURER pot bearings can be supplied in accordance with various standards, e.g. EN 1337, DIN 4141, BS5400, AASHTO, SETRA etc.

Note:
Possibly necessary anchorage devices require additional space and are not considered within this table.

MAURER Pot Bearings

TGV viaduct
at Avignon, France

- building regulations approved
- quality supervised
- world-wide proved

Economical
due to its simple construction method.

Reliable
by use of proven materials, non-constrained displacement and use of a wear-resistant pot seal.

As basic materials steel and elastomer (carbon/PTFE) in bridge bearing quality (PTFE) are used.

Small restoring moments in case of the usual superstructural deformations.

Opposite to the base plate (bearing pot) the cover of the bearing (sliding plate) can rotate without constraint up to 360 degrees.

Maurer Söhne head office:
Frankfurter Ring 193, D-80807 Munich
p.o. box 44 01 45, D-80750 Munich
phone +49/89/3 23 94-0
fax +49/89/3 23 94-306
e-mail ba@mchn.maurer-soehne.de
Internet www.maurer-soehne.de

Maurer Söhne branch office
Zum Holzplatz 2, D-44536 Lünen
p.o. box 63 40, D-44520 Lünen
phone +49/2 31/4 34 01-0
fax +49/2 31/4 34 01-11

Maurer Söhne subsidiary plant
Kamenzer Str. 4 - 6, D-02994 Bernsdorf
p.o. box 55, D-02992 Bernsdorf
phone +49/3 57 23/2 37-0
fax +49/3 57 23/2 37-20

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