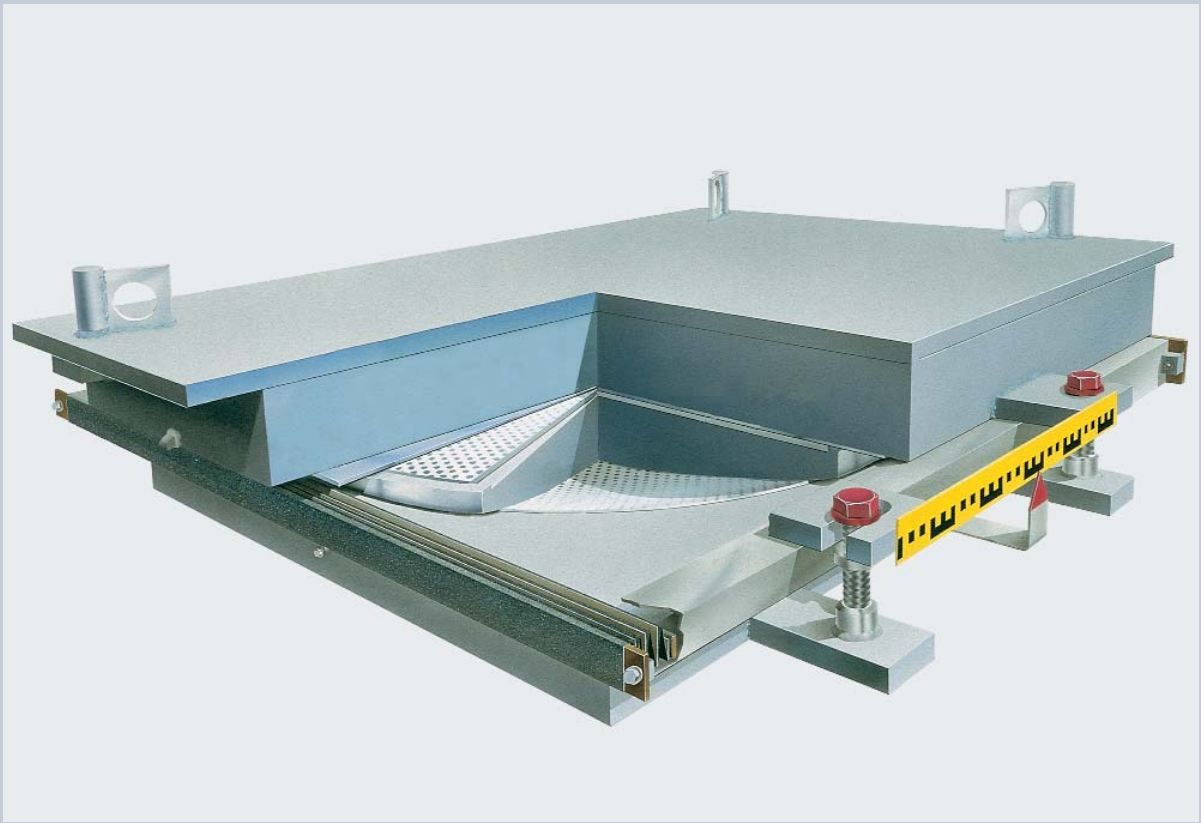
Structural Protection Systems

MAURER Spherical Bearings

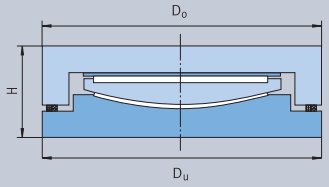


Technical information, dimensions and weights

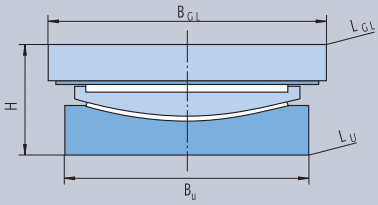
MAURER SÖHNE
Innovations in steel

Since 1876

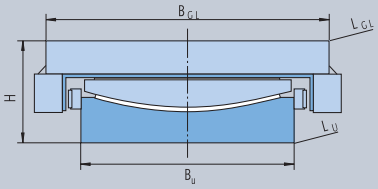
Design



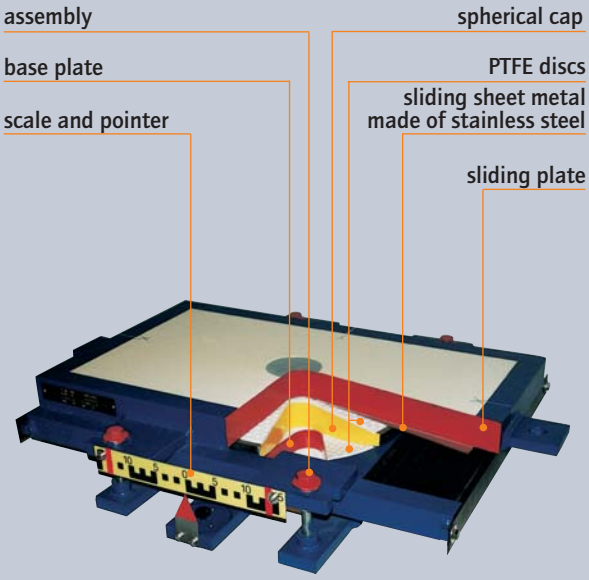
Fixed bearing *KF*



Generally mobile bearing *KGa*



Unilaterally mobile bearing *KGe*



Generally mobile spherical bearing *KGa*

The construction principle of a spherical bearing corresponds to a generally mobile bearing and thus allows rotations around any axis (point tilting) by sliding motions between base plates and spherical cap. A unilaterally mobile spherical bearing becomes a generally mobile spherical bearing by the arrangement of restraints, and a fixed spherical bearing by attachment of a stop ring.

A PTFE disc is inserted into the spherically machined out surface of the base plate. The hard-chrome plated lower surface of the spherical cap serves as sliding surface. A further PTFE disc is inserted into the flat top of the spherical cap, which slides on an austenitic, chrome-nickel-alloyed steel sheet, which is connected shear-resistantly to the sliding plate.

To increase their loadbearing capacity the PTFE discs are embeded into the steel approximately for the half of their thickness.

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 chrome-plated and/or austenitic sliding surface is finished with smallest surface roughness.

Function

The spherical bearing allows rotational movements of the superstructure by a sliding displacement of the spherical cap in the concavely shaped base plate. Thus the construction principle of a ball and socket joint is realized in the spherical bearing, which allows rotations with low resistance. Rotational movements of the superstructure in x- and y-direction are taken up in the even sliding surface between sliding plate and spherical cap.

Fixed spherical bearing KF

This bearing is fixed in both axle directions by arrangement of a stop ring on the upper plate. This permits transmission of horizontal forces in longitudinal and/or lateral direction from upper plate to base plate.
To prevent horizontal forces at the spherical cap a sliding surface is also provided between upper plate and spherical cap.

Generally mobile bearing KGa

Movements in x- and y-direction are possible, but no transmission of outside horizontal forces.

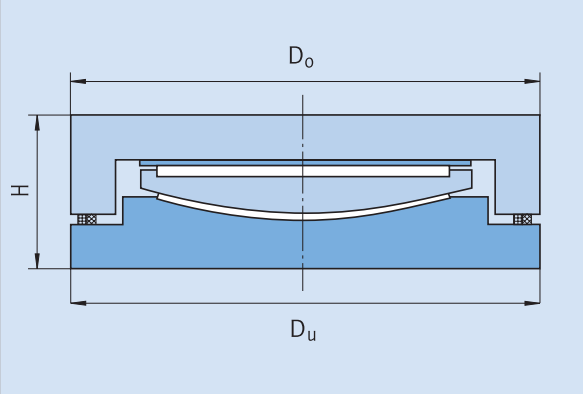
Unilaterally mobile bearing KGe

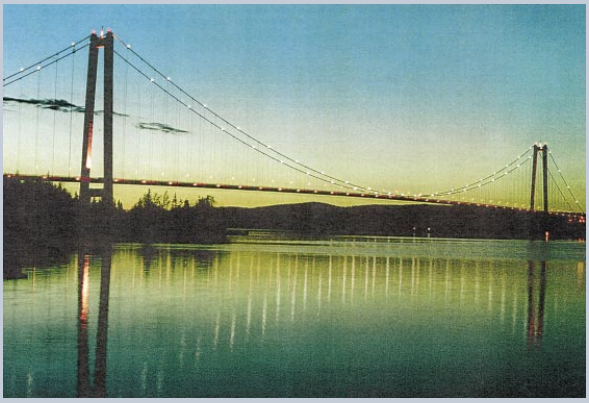
This bearing is fixed in one axis direction by restraints and thus allows transmission of horizontal forces from the upper plate into the base plate in this direction.

The spherical cap does not contribute to the transmission of horizontal forces. Rotations laterally to the direction of displacement, and thus a skewing of both restraints relative to the base plate, are levelled by tilting units, which are arranged at the base plate and are able to roll off. Frictional resistances in the contact area between guide and tilting units are kept low by suitable sliding surfaces.

Fixed spherical bearing *KF – 32 N/mm²*

Dimensions and weights acc. to German approval





Höga Kusten Bron, Sweden

Permissible concrete pressure = 32 N/mm²					
type of bearing	load V kN	H mm	D_u mm	D_o mm	weight kg
KF – 1	1000	112	300	300	66
KF – 2	2000	116	370	370	99
KF – 3	3000	116	420	420	126
KF – 4	4000	116	470	470	155
KF – 5	5000	122	510	510	190
KF – 6	6000	125	550	550	227
KF – 7	7000	133	590	590	277
KF – 8	8000	134	650	650	336
KF – 9	9000	144	670	670	384
KF – 10	10000	144	710	710	431
KF – 11	11000	152	740	740	495
KF – 12	12000	160	770	770	567
KF – 13	13000	163	800	800	617
KF – 14	14000	165	830	830	670
KF – 15	15000	172	860	860	757
KF – 16	16000	172	890	890	772
KF – 17	17000	172	920	920	860
KF – 18	18000	179	950	950	955
KF – 19	19000	185	970	970	1030
KF – 20	20000	189	990	990	1096
KF – 22	22000	200	1040	1040	1288
KF – 24	24000	202	1090	1090	1421
KF – 26	26000	208	1130	1130	1573
KF – 28	28000	216	1170	1170	1755
KF – 30	30000	229	1210	1210	1988

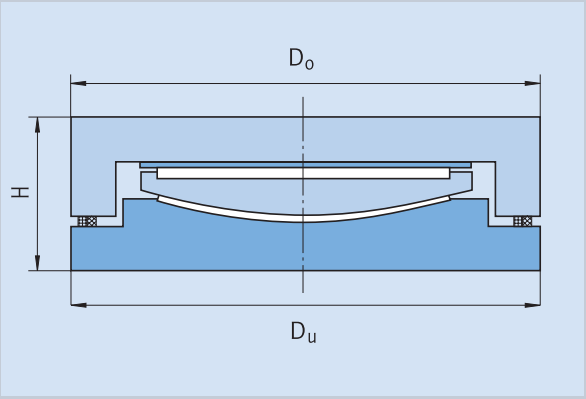
The table is based on a permissible pressure of σ exz. = 32 N/mm² at the concrete connections. We supposed normal conditions min. V = 0.5 · max. V and a horizontal force H_{Res} = 0.1 · max. V, angular rotation tan $\varphi = \pm 0.01$. The table is also applicable for steel bridges.

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 spherical 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.

Fixed spherical bearing *KF – 26 N/mm²*
Dimensions and weights acc. to German approval



Bridge over the river Elbe at Pirna, Germany

Permissible concrete pressure = 26 N/mm²					
type of bearing	load V kN	H mm	D_u mm	D_o mm	weight kg
KF – 1	1000	112	300	300	66
KF – 2	2000	116	370	370	99
KF – 3	3000	116	430	430	131
KF – 4	4000	122	500	500	183
KF – 5	5000	133	550	550	239
KF – 6	6000	138	610	610	305
KF – 7	7000	146	650	650	367
KF – 8	8000	151	700	700	439
KF – 9	9000	163	740	740	536
KF – 10	10000	163	780	780	590
KF – 11	11000	171	810	810	667
KF – 12	12000	185	850	850	795
KF – 13	13000	193	890	890	908
KF – 14	14000	195	920	920	980
KF – 15	15000	200	950	950	1092
KF – 16	16000	200	990	990	1167
KF – 17	17000	207	1010	1010	1256
KF – 18	18000	215	1040	1040	1384
KF – 19	19000	222	1070	1070	1516
KF – 20	20000	230	1100	1100	1665
KF – 22	22000	236	1140	1140	1826
KF – 24	24000	247	1200	1200	2119
KF – 26	26000	257	1250	1250	2394
KF – 28	28000	265	1290	1290	2633
KF – 30	30000	280	1340	1340	2999

The table is based on a permissible pressure of σ exz. = 26 N/mm² at the concrete connections. 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. The table is also applicable for steel bridges.

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 spherical bearings can be supplied in accordance with various standards, e.g. EN 1337, DIN 4141, BS5400, AASHTO, SETRA etc.

Note:
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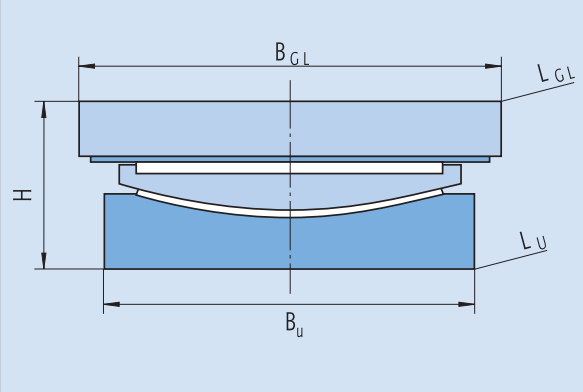
BA08.1 GB·3000·03.01

Generally mobile spherical bearing *KGa – 32 N/mm²*
Dimensions and weights acc. to German approval



Waterway crossing Magdeburg, Germany

Permissible concrete pressure = 32 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
KGa – 1	1000	109	210	280	380	72	495	81	610	90
KGa – 2	2000	113	280	350	450	105	565	117	680	128
KGa – 3	3000	115	340	420	510	142	625	156	740	169
KGa – 4	4000	118	390	470	560	177	675	194	790	210
KGa – 5	5000	125	430	520	600	215	715	237	830	258
KGa – 6	6000	126	470	570	640	261	755	283	870	305
KGa – 7	7000	128	510	610	680	298	795	326	910	354
KGa – 8	8000	134	550	650	720	362	835	394	950	426
KGa – 9	9000	137	570	680	740	398	855	431	970	463
KGa – 10	10000	138	610	720	780	455	895	491	1010	526
KGa – 11	11000	145	630	750	810	516	920	550	1030	584
KGa – 12	12000	154	660	780	840	591	950	628	1060	665
KGa – 13	13000	155	690	810	870	651	980	691	1090	730
KGa – 14	14000	155	710	840	900	695	1005	732	1110	768
KGa – 15	15000	155	740	870	930	792	1035	832	1140	872
KGa – 16	16000	159	770	900	960	811	1065	864	1170	917
KGa – 17	17000	164	790	930	990	919	1090	959	1190	998
KGa – 18	18000	167	810	950	1010	968	1110	1013	1210	1058
KGa – 19	19000	174	830	970	1030	1054	1130	1096	1230	1138
KGa – 20	20000	178	860	1000	1060	1156	1160	1208	1260	1260
KGa – 22	22000	192	890	1040	1100	1329	1200	1379	1300	1428
KGa – 24	24000	194	940	1090	1150	1487	1250	1547	1350	1606
KGa – 26	26000	197	970	1130	1190	1621	1290	1685	1390	1749
KGa – 28	28000	203	1010	1170	1230	1802	1330	1871	1430	1940
KGa – 30	30000	218	1040	1210	1270	2042	1370	2117	1470	2191

The table is based on a permissible pressure of σ exz. = 32 N/mm² at the concrete connections.
We supposed normal conditions min. V = 0.5 · max. V. The table is also applicable for steel bridges.

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 based.

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 spherical 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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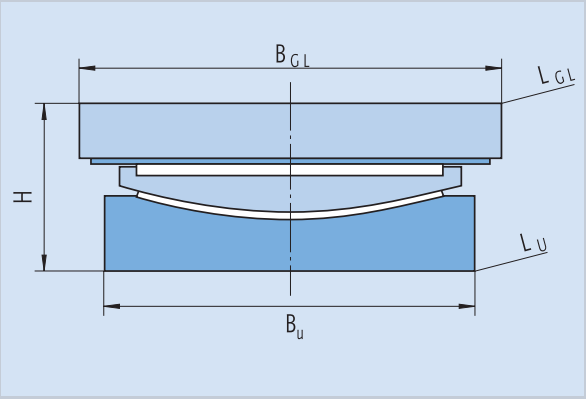
Generally mobile spherical bearing *KGa – 26 N/mm²*
Dimensions and weights acc. to German approval



Fulda-Talbrücke Solms, 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	weight kg	ex = ±100 mm L_{GL} mm	weight kg	ex = ±150 mm L_{GL} mm	weight kg
KGa – 1	1000	109	220	290	390	75	505	85	620	94
KGa – 2	2000	113	310	380	480	119	595	131	710	143
KGa – 3	3000	115	370	450	540	159	655	174	770	188
KGa – 4	4000	120	430	520	600	215	715	235	830	254
KGa – 5	5000	128	470	570	640	269	755	293	870	317
KGa – 6	6000	130	520	620	690	331	805	359	920	387
KGa – 7	7000	140	560	670	730	406	845	440	960	473
KGa – 8	8000	145	600	710	770	473	885	512	1000	551
KGa – 9	9000	152	630	750	810	554	920	594	1030	633
KGa – 10	10000	152	670	790	850	620	960	663	1070	705
KGa – 11	11000	161	700	820	880	710	990	759	1100	808
KGa – 12	12000	172	730	860	920	828	1025	878	1130	927
KGa – 13	13000	174	760	890	950	904	1055	957	1160	1009
KGa – 14	14000	174	780	920	980	962	1080	1015	1180	1068
KGa – 15	15000	180	810	950	1010	1081	1110	1138	1210	1195
KGa – 16	16000	180	850	990	1050	1146	1150	1206	1250	1265
KGa – 17	17000	191	870	1020	1080	1305	1180	1371	1280	1436
KGa – 18	18000	194	890	1040	1100	1376	1200	1444	1300	1511
KGa – 19	19000	199	920	1070	1130	1495	1230	1567	1330	1639
KGa – 20	20000	210	940	1090	1150	1646	1250	1722	1350	1798
KGa – 22	22000	217	980	1140	1200	1839	1300	1921	1400	2003
KGa – 24	24000	226	1030	1200	1260	2132	1360	2223	1460	2314
KGa – 26	26000	232	1070	1240	1300	2354	1400	2452	1500	2550
KGa – 28	28000	240	1110	1290	1350	2634	1450	2742	1550	2849
KGa – 30	30000	255	1150	1330	1390	2955	1490	3069	1590	3182

The table is based on a permissible pressure of σ exz. = 26 N/mm² at the concrete connections. We supposed normal conditions min. V = 0.5 · max. V. The table is also applicable for steel bridges.

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 based.

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 spherical bearings can be supplied in accordance with various standards, e.g. EN 1337, DIN 4141, BS5400, AASHTO, SETRA etc.

Note:
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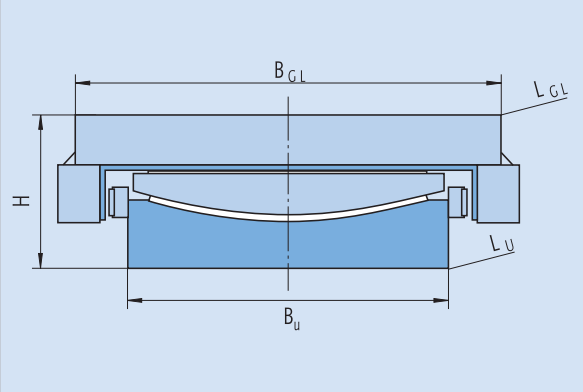
BA08.2GB-3000-03.01

Unilaterally mobile spherical bearing *KGe – 32 N/mm²*
Dimensions and weights acc. to German approval



Talbrücke Schnaittach, Germany

Permissible concrete pressure = 32 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
KGe – 1	1000	124	220	340	390	101	505	117	620	132
KGe – 2	2000	127	300	420	460	149	575	168	690	186
KGe – 3	3000	127	350	470	520	192	635	213	750	233
KGe – 4	4000	129	400	520	570	239	685	262	800	285
KGe – 5	5000	138	450	550	620	302	735	329	850	356
KGe – 6	6000	140	490	590	660	353	775	383	890	413
KGe – 7	7000	152	530	620	700	434	815	468	930	501
KGe – 8	8000	152	560	680	730	484	845	520	960	556
KGe – 9	9000	157	590	700	760	550	875	590	990	630
KGe – 10	10000	157	630	740	800	617	915	659	1030	700
KGe – 11	11000	172	650	760	830	709	940	753	1050	796
KGe – 12	12000	177	680	780	860	789	970	836	1080	882
KGe – 13	13000	185	710	810	900	893	1005	942	1110	990
KGe – 14	14000	185	740	830	930	959	1035	1010	1140	1061
KGe – 15	15000	186	760	850	950	1024	1055	1078	1160	1132
KGe – 16	16000	186	790	900	990	1108	1090	1162	1190	1216
KGe – 17	17000	186	810	910	1010	1158	1110	1214	1210	1269
KGe – 18	18000	192	840	940	1040	1273	1140	1334	1240	1394
KGe – 19	19000	198	860	960	1060	1365	1160	1430	1260	1495
KGe – 20	20000	200	870	980	1080	1439	1180	1505	1280	1571
KGe – 22	22000	208	920	1030	1130	1638	1230	1709	1330	1780
KGe – 24	24000	211	960	1080	1180	1822	1280	1900	1380	1977
KGe – 26	26000	214	1000	1120	1220	1990	1320	2073	1420	2155
KGe – 28	28000	222	1040	1160	1260	2228	1360	2318	1460	2408
KGe – 30	30000	234	1070	1200	1300	2498	1400	2596	1500	2694

The table is based on a permissible pressure of σ exz. = 32 N/mm² at the concrete connections.
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 $\varphi = \pm$ 0.01.
The table is also applicable for steel bridges.

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 spherical 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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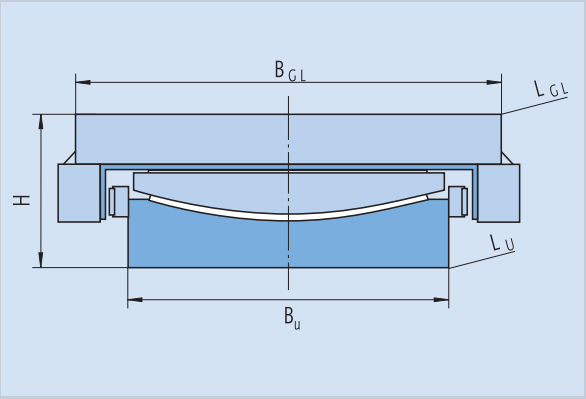
Since 1876

Unilaterally mobile spherical bearing *KGe – 26 N/mm²*
Dimensions and weights acc. to German approval



Bridge over the river Rhine at Beeckerwerth, 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
KGe – 1	1000	124	240	340	410	108	525	124	640	139
KGe – 2	2000	127	320	420	490	162	605	181	720	200
KGe – 3	3000	130	390	470	560	220	675	245	790	269
KGe – 4	4000	147	450	520	620	308	735	336	850	364
KGe – 5	5000	159	490	550	660	383	775	418	890	453
KGe – 6	6000	160	540	600	710	457	825	494	940	531
KGe – 7	7000	165	580	650	750	544	865	587	980	629
KGe – 8	8000	165	620	690	790	608	905	653	1020	698
KGe – 9	9000	182	650	730	830	735	940	784	1050	832
KGe – 10	10000	182	690	770	870	819	980	870	1090	921
KGe – 11	11000	193	720	810	910	951	1015	1010	1120	1069
KGe – 12	12000	199	750	840	940	1057	1045	1118	1150	1178
KGe – 13	13000	203	780	880	980	1175	1080	1238	1180	1301
KGe – 14	14000	203	810	910	1010	1248	1110	1314	1210	1379
KGe – 15	15000	208	840	940	1040	1367	1140	1438	1240	1508
KGe – 16	16000	209	870	980	1080	1492	1180	1567	1280	1642
KGe – 17	17000	213	900	1010	1110	1627	1210	1709	1310	1791
KGe – 18	18000	215	920	1030	1130	1701	1230	1785	1330	1868
KGe – 19	19000	217	940	1060	1160	1801	1260	1888	1360	1974
KGe – 20	20000	231	970	1090	1190	2030	1290	2124	1390	2217
KGe – 22	22000	236	1020	1140	1240	2258	1340	2358	1440	2458
KGe – 24	24000	238	1070	1190	1280	2451	1385	2630	1490	2808
KGe – 26	26000	255	1120	1240	1340	2894	1440	3013	1540	3131
KGe – 28	28000	258	1160	1280	1380	3124	1480	3250	1580	3375
KGe –30	30000	277	1200	1320	1420	3534	1520	3668	1620	3802

The table is based on a permissible pressure of σ exz. = 26 N/mm² at the concrete connections.
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 $\varphi = \pm 0.01$. The table is also applicable for steel bridges.

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 spherical 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.

BA08.3GB.3000-03.01

MAURER Spherical Bearings

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

Bridge over the river Main
at Nantenbach, Germany

Further advantages:

- small rotational and sliding resistances
- important torsions
- compact construction method

Area of application:

- middle to very high load range
- large torsions

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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