



GUCHEN[®] SPHERICAL BEARING

Engineered for Movement. Built for Longevity.

Hebei Guchen Engineering Rubber Co., Ltd.

COMPANY PROFILE



Guchen Bridge Systems is a premier manufacturer and Leading Global Supplier of Spherical Bearings. Operating from our advanced production facilities in Hebei, China, we engineer durability and reliability into every product, ensuring the safety and longevity of critical infrastructure projects worldwide.

For over 15 years, we have combined precision engineering with rigorous quality control to deliver solutions that stand up to the most demanding conditions—from heavy traffic loads and extreme weather to seismic events. Our commitment is not just to meet expectations but to exceed them, providing unparalleled value and support at every stage of your project.



Why Partner With Guchen?

Engineering Excellence: Our in-house team of experienced engineers utilizes state-of-the-art design and finite element analysis (FEA) to create joints that perform flawlessly under specified movement ranges and dynamic loads. We offer custom-designed solutions tailored to your project's unique requirements.

Uncompromising Quality: From the selection of high-grade, corrosion-resistant steels and advanced, weather-proof elastomers to our meticulous manufacturing processes, every step is controlled to ensure superior product life. Our products comply with major international standards, including EN, AASHTO, and DIN.

Proven Global Performance: Our Spherical Bearings have been specified and installed for over 30 projects worldwide, encompassing a wide range of structures including wide bridges, curved bridges, link bridges (skybridges), and space frames. This global experience equips us with a deep understanding of the diverse challenges faced by engineers and contractors.

Total Project Support: We are more than just a supplier; we are your partner. We provide comprehensive technical documentation, detailed installation guidance, and responsive after-sales support to ensure seamless integration and optimal performance of our systems.

Our Commitment

At Guchen Bridge Systems, our mission is to empower engineers and builders with reliable, innovative, and cost-effective spherical bearings that ensure the structural integrity and safety of bridges for decades to come.

Let us help you build smarter, safer, and longer-lasting.

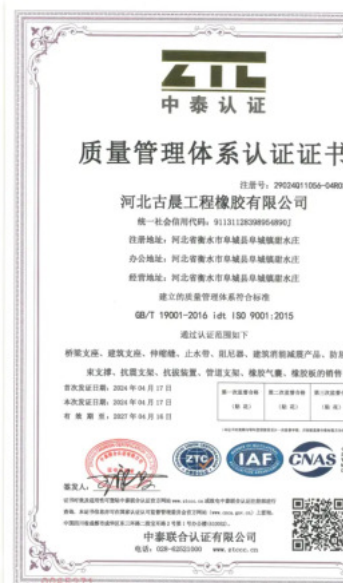
CERTIFICATIONS & COMPLIANCE



国家企业信用信息公示系统网址: <http://www.gsxt.gov.cn>

市场主体应当于每年1月1日至6月30日通过国家企业信用信息公示系统报送公示年度报告。

国家市场监督管理总局监制





QZ Series Spherical Bearings



I. Structural Features and Functions

The QZ series spherical bearing consists of an upper support plate, a lower support plate, a convex intermediate plate, and two polytetrafluoroethylene (PTFE) plates of different shapes. The center of the lower plate features a concave spherical surface that corresponds to the convex intermediate plate. A curved PTFE plate is placed between them, allowing rotation at the beam end through sliding on the spherical surface. The stainless steel plate on the upper support plate and another PTFE plate on the intermediate plate form a second sliding surface, accommodating the expansion and contraction displacements of the beam caused by temperature variations and other factors.

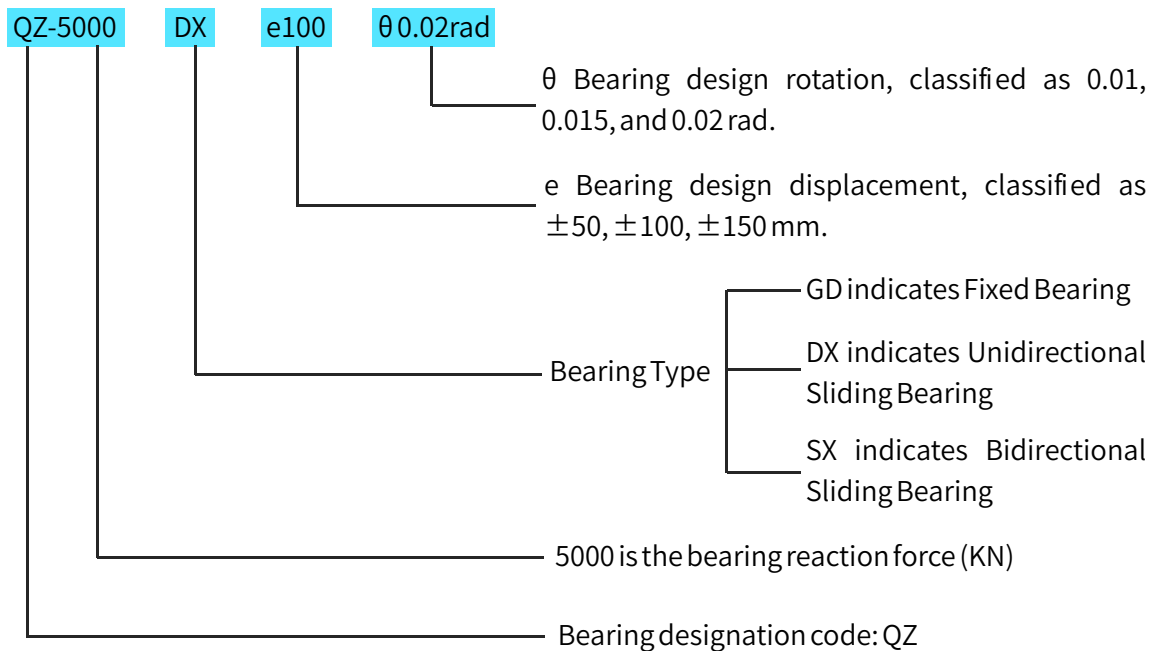
The spherical bearing ensures reliable force transmission and consistent rotational performance in all directions. It not only possesses the characteristics of large bearing capacity and significant horizontal displacement found in pot rubber bearings but also accommodates large rotation angles, making it suitable for wide bridges and curved bridges. Since the load-bearing components do not use rubber elements, issues such as rubber brittleness at low temperatures are eliminated, making it particularly suitable for low-temperature regions.

The QZ series spherical bearings are designed and manufactured in accordance with the GB/T 17955 standard.

Compared to pot rubber bearings, they offer the following advantages:

1. The spherical bearing transmits force through the spherical surface, avoiding stress concentration phenomena and ensuring a relatively uniform reaction force on the concrete.
2. The rotation of the spherical bearing is achieved by the sliding of the spherical PTFE plate. The rotational moment is small and depends only on the radius of the spherical surface and the friction coefficient of the PTFE plate, independent of the rotation angle. This makes it especially suitable for applications requiring large rotation angles, with a design rotation angle of up to 0.05 rad or more.
3. The rotational performance is consistent in all directions, making it suitable for wide bridges and curved bridges.
4. The bearing does not use rubber for load-bearing, eliminating the impact of rubber aging on rotational performance and making it particularly suitable for low-temperature regions.

II. Structural Features and Functions



III. Technical Performance of QZ Series Spherical Bearings

1. Bearing reaction force (vertical load-bearing capacity) is classified into 29 grades: 1500, 2000, 2500, 3000, 3500, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 12500, 15000, 17500, 20000, 22500, 25000, 27500, 30000, 32500, 35000, 37500, 40000, 45000, 50000, 55000, 60000 KN.

2. Bearing design rotation angle θ is classified as 0.02, 0.03, 0.04, 0.05, and 0.06 rad.

3. Bearing Design Displacement

Longitudinal direction: For 1000-2500 KN: ± 50 and ± 100 mm; For 3000-10000 KN: $e = \pm 50$, ± 100 , and ± 150 mm. Transverse direction (SX bidirectional sliding bearing): $e = \pm 20$ mm. Design displacement can be customized according to project requirements.

4. Bearing Design Friction coefficient

Under the condition of silicone grease lubrication on the PTFE plate and a stress of approximately 30 MPa, the values are as follows: Normal temperature ($-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$): 0.03; Low temperature ($-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$): 0.05.

5. Horizontal Force Capacity of Bearings:

Unidirectional Sliding Bearings (DX): The horizontal force in the transverse bridge direction is 10% of the bearing reaction force.

Fixed Bearings (GD): The withstandable horizontal force is 10% of the bearing reaction force.

IV. Installation of QZ Spherical Bearings

1. When using this series of bearings, the concrete grade for the bridge girder and the supporting parts of piers and abutments must not be lower than C35. In special circumstances, consent from the design unit must be obtained.

2. Installing the Bearing and Anchor Bolts: Use copper wedge blocks at the four corners of the lower support plate to level the bearing, ensuring the bottom surface of the lower support plate is 20-50mm higher than the pier top surface. Align the centerlines of the bearing in the longitudinal and transverse bridge directions to meet design requirements. Grout the anchor bolt holes and the bedding layer under the bearing bottom surface with epoxy mortar (refer to the diagram below).

Note: Example Epoxy Mortar Mix Ratio (by weight):

Epoxy Resin (6101): 100, Ethylenediamine: 8-10 or Tetraethylenepentamine: 14-15; Dibutyl Phthalate: 12; Quartz Powder or Fine Sand: 250-300.

3. If necessary, the connection between the bearing and the girder/pier can also be achieved by welding to embedded steel plates. When using welded connections, first position the bearing accurately. Weld the upper and lower support plates to the pre-embedded steel plates in the girder and pier using intermittent welding. Take care to prevent damage to the bearing and concrete during welding.

4. The installation height must conform to the design, ensuring the supporting plane of the bearing is level and flat. The height difference at the four corners of the bearing support surface must not exceed 2mm.

5. The upper and lower connecting plates should be removed after the girder installation is complete to prevent restraint of the girder's normal rotation. Subsequently, install the rubber anti-dust seals for sliding bearings promptly.

6. Upon ex-factory, the bearings are leveled by the manufacturer, and the connecting bolts are tightened to prevent rotation and tilting during installation. Bearings can be preset with rotation angles and displacements according to design needs. However, the user must specify the required preset angle and displacement values when placing the order, allowing the manufacturer to make these adjustments during assembly.

V. Maintenance of QZ Spherical Bearings

1. Perform a comprehensive inspection and maintenance of the bearings annually during service.

2. Check if the anchor bolts are sheared, and inspect the rubber seals for cracking or aging.

3. Check if the relative displacements of the bearings are uniform, and record the position of each bearing.

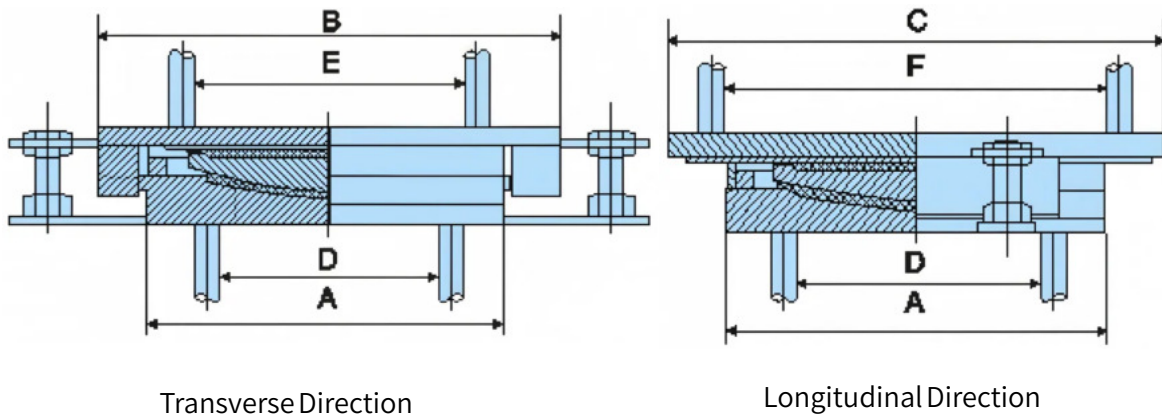
4. Remove debris and dust from the areas around the bearings, and carefully wipe the dust off the stainless steel surfaces using cotton yarn.

5. Loosen the anchor nuts once, then clean and oil them to prevent rust seizure, before tightening them again.

6. Check and record the height changes of the bearings at fixed points to evaluate the wear of the PTFE plates inside. If the height change of a bearing exceeds 3mm, remove the rubber seal and inspect the condition of the PTFE plate.

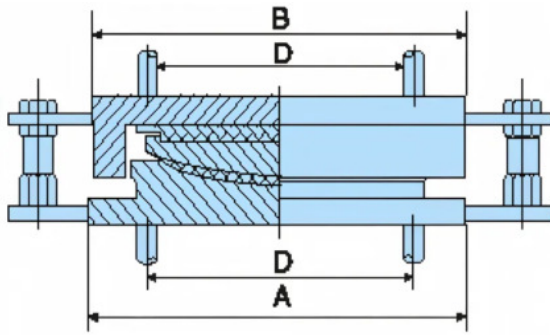
7. Regularly apply anti-rust paint to the steel components of the bearings (excluding the stainless steel sliding surfaces).

QZ Series Spherical Bearings Unidirectional Sliding (DX) Dimensional Parameters Table

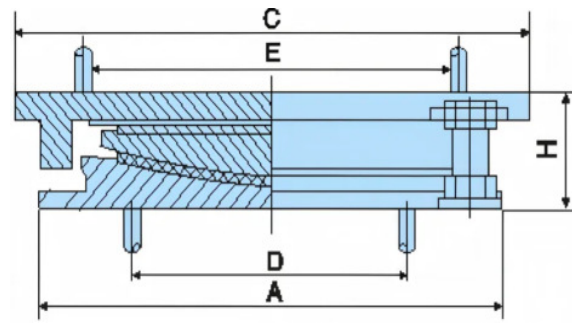


Bearing Reaction Force (KN)	Bearing Rotation Angle θ (rad)	A	B	C			D	E	F			H	Bearing Weight (KG)			Anchor Bolt Diameter x Length (MxL)	Bolt Weight (KG)
				e=±50	e=±100	e=±150			e=±50	e=±100	e=±150		e=±50	e=±100	e=±150		
1000	0.01 ~ 0.02	300	410	410	510		240	290	350	450		79	76	83		M20 x 400	8.1
1500	0.01 ~ 0.02	350	460	460	560		290	330	400	500		84	97	106		M20 x 400	
2000	0.01 ~ 0.02	400	510	510	610		320	360	430	530		89	127	136		M20 x 400	
2500	0.01 ~ 0.02	445	555	555	655		355	395	450	550		105	184	197		M24 x 460	13.5
3000	0.01 ~ 0.02	480	600	590	690	790	380	420	470	570	670	110	220	234	248	M24 x 460	
4000	0.01 ~ 0.02	540	670	650	750	850	430	470	530	630	730	115	289	304	320	M27 x 500	18.5
5000	0.01 ~ 0.02	800	710	710	810	910	490	530	580	680	780	127	385	405	425	M30 x 500	23
8000	0.01 ~ 0.02	680	780	770	870	970	530	570	640	740	840	137	490	513	535	M33 x 500	27.5
7000	0.01 ~ 0.02	710	840	820	920	1020	570	610	680	780	880	147	613	640	668	M36 x 500	32.8
8000	0.01 ~ 0.02	740	880	850	950	1050	605	645	720	820	920	152	699	728	756	M39 x 600	46
9000	0.01 ~ 0.02	790	930	900	1000	1100	640	680	780	880	960	162	850	884	918	M42 x 600	53.5
10000	0.01 ~ 0.02	825	965	935	1035	1135	665	705	790	890	990	167	938	974	1009	M42 x 600	
12500	0.010	910	990	1000	1100	1200	710	790	800	900	1000	191	1125	1162	1198	M45 x 600	61
	0.015	980	1010	1020	1120	1220	780	810	820	920	1020		1162	1200	1237		
	0.020	980	1040	1050	1150	1250	760	840	850	950	1050		1228	1267	1305		
15000	0.010	990	1080	1080	1180	1280	790	880	880	980	1080	207	1414	1454	1444	M48 x 600	69.5
	0.015	1010	1100	1100	1200	1300	810	900	900	1000	1100		1462	1502	1543		
	0.020	1040	1130	1130	1230	1330	840	930	930	1030	1130		1550	1591	1633		
17500	0.010	1050	1150	1140	1240	1340	810	910	900	1000	1100	211	1673	1715	1758	M56 x 800	126
	0.015	1090	1190	1180	1280	1380	850	950	940	1040	1140		1775	1819	1863		
	0.020	1120	1220	1210	1310	1410	880	980	970	1070	1170		1854	1899	1944		
20000	0.010	1110	1210	1200	1300	1400	870	970	980	1080	1180	227	2007	2057	2106	M80 x 800	145
	0.015	1150	1250	1240	1340	1440	910	1010	1000	1100	1200		2124	2175	2226		
	0.020	1180	1280	1270	1370	1470	940	1040	1030	1130	1230		2215	2267	2319		

QZ Series Spherical Bearings Fixed (GD) Dimensional Parameters Table



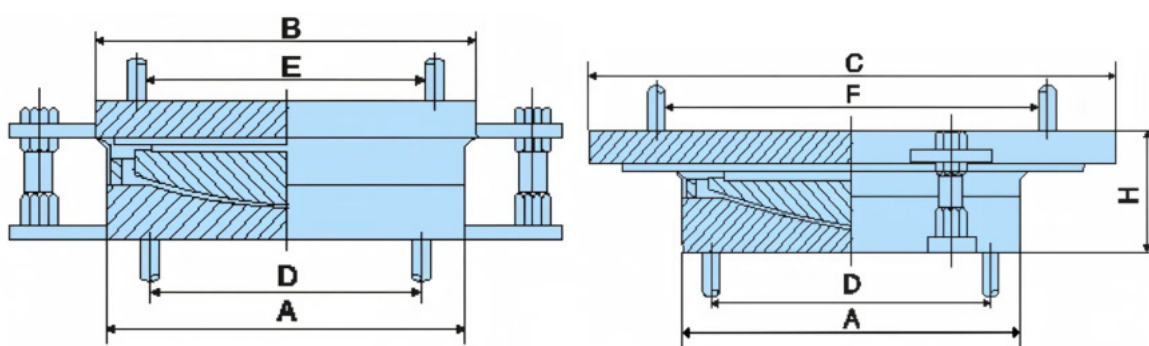
Transverse Direction



Longitudinal Direction

Bearing Reaction Force (KN)	Bearing Rotation Angle θ (rad)	A	B	C	D	E	H	Weight	Anchor Bolt Diameter \times Length (M \times L)	Bolt Weight (KG)
1000	0.01 ~ 0.02	330	320	400	260	340	79	69	M20 \times 400	8.1
1500	0.01 ~ 0.02	390	380	440	300	380	84	92	M20 \times 400	
2000	0.01 ~ 0.02	440	430	480	340	420	89	118	M20 \times 400	
2500	0.01 ~ 0.02	490	480	540	375	470	105	177	M24 \times 460	13.5
3000	0.01 ~ 0.02	530	520	570	410	500	110	208	M24 \times 460	
4000	0.01 ~ 0.02	590	580	650	460	570	115	271	M27 \times 500	18.5
5000	0.01 ~ 0.02	650	840	710	500	610	127	379	M30 \times 500	23
6000	0.01 ~ 0.02	710	700	790	550	680	137	486	M33 \times 500	27.5
7000	0.01 ~ 0.02	770	760	840	600	730	147	625	M36 \times 500	32.6
8000	0.01 ~ 0.02	810	800	890	630	780	152	717	M39 \times 600	46
9000	0.01 ~ 0.02	860	850	940	670	820	162	878	M42 \times 600	53.5
10000	0.01 ~ 0.02	900	890	970	695	850	167	970	M42 \times 600	
12500	0.010	970	960	1040	750	840	191	1145	M45 \times 600	61
	0.015	990	980	1060	770	860		1194		
	0.020	1020	1010	1080	790	880		1260		
15000	0.010	1050	1040	1100	810	900	207	1420	M48 \times 600	69.5
	0.015	1070	1060	1120	830	920		1474		
	0.020	1110	1090	1140	850	940		1551		
17500	0.010	1110	1100	1200	870	960	211	1694	M56 \times 800	126
	0.015	1150	1140	1230	900	990		1803		
	0.020	1180	1170	1260	920	1020		1890		
20000	0.010	1170	1160	1280	920	1020	227	1930	M60 \times 800	145
	0.015	1210	1200	1310	940	1050		2053		
	0.020	1240	1230	1340	960	1080		2153		

QZ Series Spherical Bearings Bidirectional Sliding (SX) Dimensional Parameters Table



Transverse Direction

Longitudinal Direction

Bearing Reaction Force (KN)	Bearing Rotation Angle θ (rad)	A	B	C			D	E	F			Bearing Weight (KG)			H	Anchor Bolt Diameter × Length (M×L)	Bolt Weight (KG)
				e=±50	e=±100	e=±150			e=±50	e=±100	e=±150	e=±50	e=±100	e=±150			
1000	0.01 ~ 0.02	300	350	410	510		240	290	350	450		65	72		79	M20 × 400	8.1
1500	0.01 ~ 0.02	350	390	460	560		290	330	400	500		85	93		84	M20 × 400	
2000	0.01 ~ 0.02	400	440	510	610		320	380	430	530		111	119		89	M20 × 400	
2500	0.01 ~ 0.02	445	485	555	655		355	395	450	550		166	178		105	M24 × 460	13.5
3000	0.01 ~ 0.02	480	520	590	690	790	380	420	470	570	670	196	208	220	110	M24 × 460	
4000	0.01 ~ 0.02	540	580	650	750	850	430	470	530	630	730	254	267	281	115	M27 × 500	18.5
5000	0.01 ~ 0.02	600	640	710	810	910	490	530	580	680	780	351	370	388	127	M30 × 500	23
6000	0.01 ~ 0.02	660	700	770	870	970	530	570	640	740	840	447	467	487	137	M33 × 500	27.5
7000	0.01 ~ 0.02	710	750	820	920	1020	570	610	680	780	880	559	583	608	147	M36 × 500	32.6
8000	0.01 ~ 0.02	740	780	850	950	1050	605	645	720	820	920	631	657	682	152	M39 × 600	46
9000	0.01 ~ 0.02	790	830	900	1000	1100	640	680	760	860	960	771	801	832	162	M42 × 600	53.5
10000	0.01 ~ 0.02	825	865	935	1035	1135	665	705	790	890	990	851	883	915	167	M42 × 600	
12500	0.010	910	940	1000	1100	1200	710	740	800	900	1000	1048	1081	1115			
	0.015	930	980	1020	1120	1220	730	780	820	920	1020	1083	1118	1154	191	M45 × 600	61
	0.020	960	990	1050	1150	1250	760	790	850	950	1050	1148	1185	1221			
15000	0.010	990	1020	1080	1180	1280	790	820	880	980	1080	1321	1358	1396			
	0.015	1010	1040	1100	1200	1300	810	840	900	1000	1100	1368	1406	1445	207	M48 × 600	69.5
	0.020	1040	1070	1130	1230	1330	840	870	930	1030	1130	1440	1480	1519			
17500	0.010	1050	1080	1140	1240	1340	810	840	900	1000	1100	1580	1600	1640			
	0.015	1090	1120	1180	1280	1380	850	880	940	1040	1140	1681	1702	1744	211	M58 × 800	126
	0.020	1120	1150	1210	1310	1410	880	910	970	1070	1170	1739	1782	1824			
20000	0.010	1110	1140	1200	1300	1400	870	900	980	1080	1180	1878	1923	1970			
	0.015	1150	1180	1240	1340	1440	910	940	1000	1100	1200	1992	2040	2088	227	M60 × 800	145
	0.020	1180	1210	1270	1370	1470	940	970	1030	1130	1230	2082	2132	2180			