

轴承 Bearing	系列、尺寸范围 Series and bore diameter range	滑动摩擦副 Sliding contact surfaces	使用温度范围 Permissible operating temperature range	产品特点 Design characteristics	页码 Page
角接触关节轴承 Angular contact spherical plain bearings					
	GAC...S 25~200	钢/钢 Steel/Steel	-50℃~+150℃	内、外圈材料均为轴承钢，淬火，磷化，外圈有润滑油槽油孔，内球面有两条交叉润滑槽，滑动表面涂敷二硫化钼。 Bearing rings of carbon chromium steel, hardened and phosphated, sliding surface treated with MoS ₂ . Outer ring have groove and lubrication holes, sliding surface with two cross lubrication grooves	68
	GACZ...S 12.7~152.4			产品特点与 GAC...S 系列相同，但为英制尺寸。 As series GAC...S, but with inch dimensions.	69
	GAC...T 25~200	钢/PTFE 编织物 Steel/PTFE fabric		外圈材料为轴承钢，淬火，球面粘贴 PTFE 编织物；内圈材料为轴承钢，淬火，球面镀硬铬。 Outer rings of carbon chromium steel, hardened, with sliding surface of PTFE fabric; Inner ring of carbon chromium steel, hardened, sliding surface hard chromium plated.	70
	GAC...N 25~120	钢/PTFE 塑料 Steel/PTFE plastic	-40℃~+75℃	外圈材料为轴承钢，淬火，球面衬有 PTFE 塑料，内圈材料为轴承钢，淬火，球面镀硬铬。 Outer rings of carbon chromium steel, hardened, with sliding surface of PTFE plastic; Inner ring of carbon chromium steel, hardened, sliding surface treated with hard chromium plating.	71
推力关节轴承 Thrust spherical plain bearings					
	GX...S 10~200	钢/钢 Steel/Steel	-50℃~+150℃	轴、座圈材料均为轴承钢，淬火，磷化，座圈有润滑油槽油孔，滑动表面涂敷二硫化钼。 Bearing housing washer of carbon chromium steel, hardened and phosphated, have groove and lubrication holes. Shaft washer of carbon chromium steel, hardened and phosphated. Sliding surfaces treated with MoS ₂ .	75
	GX...T 10~360	钢/PTFE 编织物 Steel/PTFE fabric		座圈材料为轴承钢，淬火，球面粘贴 PTFE 编织物；轴圈材料为轴承钢，淬火，球面镀硬铬。 Bearing housing washer of carbon chromium steel, hardened, with sliding surface of PTFE fabric. Shaft washer of carbon chromium steel, hardened, sliding surface hard chromium plated.	76
	GX...N 17~120	钢/PTFE 塑料 Steel/PTFE plastic	-40℃~+75℃	座圈材料为轴承钢，淬火，球面衬有 PTFE 塑料，轴圈材料为轴承钢，淬火，球面镀硬铬。 Bearing housing washer of carbon chromium steel, hardened, with sliding surface of PTFE plastic. Shaft washer of carbon chromium steel, hardened, sliding surface hard chromium plated.	77

额定载荷

额定动载荷是用来计算关节轴承所承受的动应力。它代表在恒定大小和方向的载荷下，在一个使用寿命周期内所滑动的距离与在室温和一定的滑动速度下连续摆动的距离相当。它假定向心关节轴承、角接触关节轴承和杆端关节轴承所承受的载荷是纯径向载荷，推力关节轴承所承受的载荷是纯轴向载荷且力作用点方向处于中心。在一定载荷下的倾斜、摆动和转动运动产生了动应力，同样，在交变载荷下微小滑动（类似于振动）或高频率交变载荷下也产生了动应力。不同种类的动应力经常是联合产生的。

额定载荷的数值一般取决于具体的用途，所以不可能与其它厂商所公布的载荷值做直接比较。

额定静载荷是用来计算关节轴承所承受的静应力。当关节轴承承载时是静止的（或者偶尔的调心运动），就使用额定静载荷。当加动载的关节轴承承受大的冲击载荷时，也应考虑额定静载荷。额定静载荷代表轴承滑动表面的静接触应力达到材料的应力极限时的静止载荷。只适合于室温和假定轴承周围零件能防止轴承的变形。在较高温度下，额定静载荷必须考虑温度系数，温度系数取决于滑动摩擦副组合，额定静载荷的温度系数与额定动载荷的温度系数一样，也必须考虑不同滑动摩擦副组合所允许的使用温度范围。对于杆端关节轴承，必须考虑杆端体的强度。杆端关节轴承额定静载荷的安全系数为杆端体材料拉伸强度的 1.2 倍。

使用寿命

在混合或干摩擦条件下，向心关节轴承的使用寿命取决于轴承游隙增加或者由滑动表面逐渐磨损、滑动材料的弹性变形或滑动表面疲劳所引起的轴承摩擦系数增加。根据用途和摩擦副情况，所允许的磨损和摩擦

Load rating

Dynamic rating is used for calculations when the spherical plain bearing is subjected to dynamic stress. It represents the load, constant in magnitude and direction, under which a basic rating service life, expressed as a sliding distance, will be attained for continuous oscillating movement at a defined sliding velocity and at room temperature. It presupposes that the load acting on radial and angular spherical plain bearings and on rod ends is purely radial and that the load acting on spherical plain thrust bearings is purely axial and acts centrally. Dynamic stresses occur when tilting, oscillatory or rotational movements are made under load as well as microsliding movements under alternating loads, e.g resulting from vibration, or loads which alternate at high frequency. The various types of dynamic stress often occur in combination.

The values of load ratings are always dependent on the definition used. It is therefore not always possible to make direct comparisons with load ratings published by other manufactures.

The static load rating is used when spherical plain bearings stand still under load(or make occasional alignment movements) and it should also be considered when dynamically loaded bearings are subjected to heavy shock loads. The static load rating represents the load which can be taken up by a spherical plain bearing when static contact stress of bearing contact surface reaches the material stress limit. It is valid at room temperature and it is presupposed that the surrounding components prevent deformation of the bearing. At higher temperature, the static load rating must be multiplied by a temperature factor, depend on the sliding contact surface combination. The temperature factor are the same as for dynamically stressed bearing. It is also necessary to take into consideration the permissible temperature range for the various sliding contact surface combinations. For rod ends, it is the strength of the rod end housing under stationary load which is considered. The rod end static load ratings give a safety factor of 1.2 times the tensile strength of the rod end housing material.

Service life

The service life of a spherical plain bearing operated under mixed or dry friction conditions is determined by the increase in bearing clearance or bearing friction caused by progressive wear of the sliding surfaces, plastic deformation of the sliding material or fatigue of the sliding surface. Depending on the application, the permissible wear or permissible increase in

轴承游隙

轴承游隙是指在一定的测量力下,一个套圈相对于另一套圈在径向或轴向移动的总的距离。

有必要区别轴承安装前游隙和安装后工作游隙。由于套圈是通过过盈或过渡配合安装,套圈受到膨胀或压缩,轴承的初始游隙总是大于工作游隙。

如果轴承在所推荐的配合下安装和正常运转条件下,选用基本组游隙轴承的工作游隙是合适的。如果内、外圈都用过盈配合安装或者使用温度较高或较低时,可选用比正常组游隙较大或较小的游隙值。

润滑

对于钢对钢润滑型向心关节轴承,润滑的目的是为了减少磨损、降低摩擦和防止咬合。同时,润滑脂有防腐蚀作用。在工作过程中,周期性润滑明显提高了轴承使用寿命。

对于钢对 PTFE 编织物自润滑型向心关节轴承,编织物中的 PTFE 会转移到内圈球面。润滑一般会干扰这种转移,从而降低轴承的使用寿命。所以,这种轴承是不允许润滑的。

对于钢对 PTFE 复合材料向心关节轴承,通常,工作中是不需要润滑的,但在需要防腐蚀和改善密封情况下,在轴承或轴承周围空间填加锂基脂是允许的。

二硫化钼: 在跑合阶段,添加二硫化钼有助于轴承的跑合,减少磨损。二硫化钼处理可分为湿式和干式两种处理方式。湿式二硫化钼处理采用涂敷方式处理;干式二硫化钼处理采用喷涂方式处理,采用干式二硫化钼处理效果优于湿式二硫化钼处理。如果客户需采用干式二硫化钼处理,订货时与公司的销售部门联系。

Bearing internal clearance

Bearing internal clearance is defined as the total distance through which one ring can be moved radially(radial internal clearance) or axially(axial internal clearance) in relation to the other ring under a defined measuring load.

It is necessary to distinguish between the internal clearance of a bearing before it is mounted and the internal clearance of a mounted bearing when in operation(operational clearance).The initial clearance will always be greater than the operational clearance because the rings are expanded or compressed by interferences fits and as a result of the differences in thermal expansion of the bearing rings and mating components.

The bearing internal clearance referred to as basic has been selected so that when bearings are mounted generally recommended and operate under normal conditions a suitable operational clearance will be obtained. For other conditions, e.g. where both rings are mounted with an interference fit or where unusual temperatures prevail, bearings with greater or smaller internal clearance than normal may be required.

Lubrication

For spherical plain bearings requiring maintenance which are of the steel-on-steel type, the purpose of the lubrication is primarily to reduce wear, reduce friction and prevent scuffing. Also the grease serves to protect the bearings against corrosion. The frequency of relubrication of the bearing during its operation will appreciably extend the service life.

For steel-on-PTFE fabric spherical plain bearings, there is a transfer of PTFE from fabric to the opposing steel surface of the inner ring. Any lubrication of the sliding contact surfaces would disturb this transfer and shorten bearing life. Therefore, lubrication of these bearings is not advisable.

For steel-on-PTFE composite material spherical plain bearings, as a rule, it must not be lubricated. When operating conditions are such that enhanced sealing and protection against corrosion are required, it is recommended that the bearing or the space surrounding the bearing is filled with lithium base grease.

MoS₂ : The wear occurring during running-in phase proceeds all the more favourably the more MoS₂ is embedded in the porous-crystalline manganese phosphate. There are two type:wet MoS₂ and dry MoS₂. Wet MoS₂ is treated with dip coating ,Dry MoS₂ is treated with spray coating.The effect of dry MoS₂ is superior to wet MoS₂.If customer need dry MoS₂,please consult marketing department.

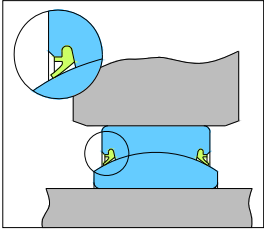
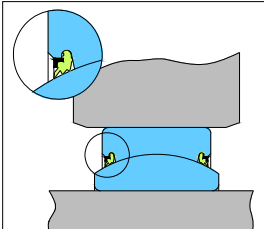
密封

大多数轴承都要装有密封圈来抵挡污物和湿气的进入。密封圈对轴承的使用寿命有决定性的影响。LS 密封圈有两种结构形式，见表 1

Sealing

Most bearing arrangements must be sealed to prevent external contamination and damp from entering the bearing. The efficiency of the sealing has a decisive influence of the service life of the bearing. LS seal has two type, see table 1.

表 1 Table 1

密封圈 Seal	简图 Illustration	产品特征 Design characteristics	适合环境 Suitability
2RS 密封圈 2RS design		聚酯弹性体密封圈 Polyurethane (-30°C ~ +130°C) 尼龙密封圈 Nylon (-30°C ~ +130°C)	<ol style="list-style-type: none"> 1. 结构紧凑的要求 2. 空间限制 3. 组合密封 4. 转动的要求 5. 长寿命的要求 <ol style="list-style-type: none"> 1. For compact bearing arrangement, mainly indoors 2. For cramped spaces 3. For high sealing demands when combined with and outboard seal 4. For bearings which are to rotate 5. For long service life with minimum maintenance
2GS 密封圈 2GS design		带骨架的橡胶密封圈 Rubbing seal of elastomer with steel backing (-25°C ~ +120°C)	<ol style="list-style-type: none"> 1. 结构紧凑的要求 2. 较高密封的要求 3. 转动的要求 4. 长寿命的要求 5. 泥或沙工况的要求 <ol style="list-style-type: none"> 1. For compact bearing arrangement, mainly indoors 2. For high sealing demands 3. For bearings which are to rotate 4. For long service life with minimum maintenance 5. For difficult operating conditions in the presence of sand or mud

精度

外圈的尺寸和公差为表面处理 and 开缝前的数值。

开缝后, 外圈外径变得有点不圆, 但当轴承装入轴承座以后, 外径就会恢复圆形 (见图 1)。

未安装的轴承外径的测量值不能做为外径原始实际值。

Accuracy

The tolerances apply to outer ring without surface treatment and splitting.

The outer rings become slightly out of round due to splitting. The roundness of the outer ring is restored once it is fitted in a housing bore produced in accordance with the specifications(Figure1).

Measurements taken of the outside diameter of the unfitted bearing cannot be used as the original actual values for the outside diameter.

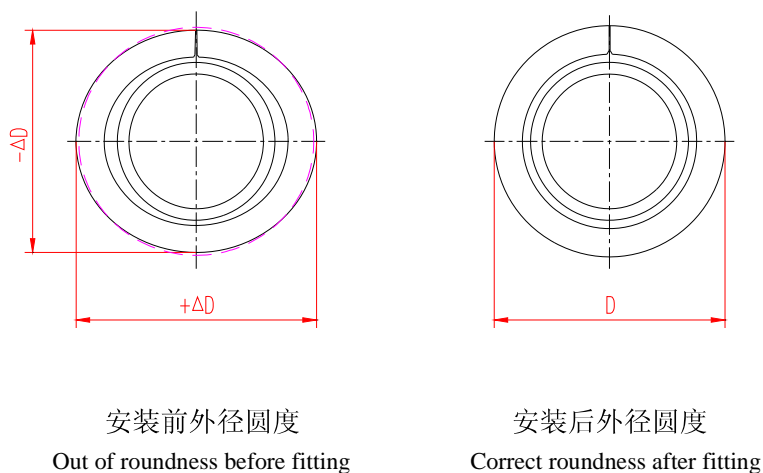


图 1 Figure1

安装

为了便于安装, 轴或者座孔的端面必须有一个 $10^\circ \sim 20^\circ$ 的引导角, 这样, 轴承比较容易装入, 且不会因为轴承的倾斜而损坏了安装表面 (见图 2)。

对于外圈开缝的向心关节轴承, 缝必须垂直于主要载荷方向。润滑孔必须位于承载方向, 这样才能在承载区域提供较好的润滑 (见图 3)。

Fitting

To facilitate mounting, the ends of pins or shafts and the edges of housing bores should have a lead chamfer of 10° to 20° . The bearings can be more easily pushed into position and there is little risk of damage to the mating surfaces being caused by skewing of the bearing(Figure2).

In radial spherical plain bearings with split outer rings, the joints are offset at 90° from the main load direction. The lubrication holes of bearings requiring maintenance are thus positioned in the load zone. This allows good lubricant distribution in the load zone area(Figure3).

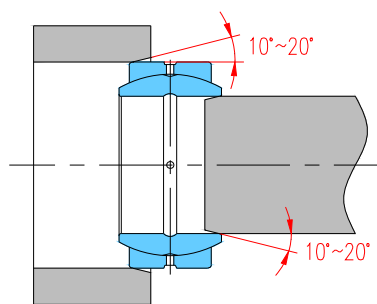


图 2 Figure2

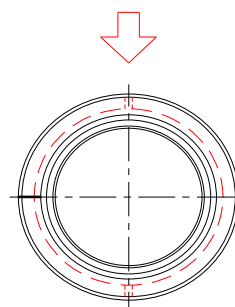


图 3 Figure3

注意事项

1. 安装面必须保持干净且没有污物。
2. 轴承不允许接触潮湿和腐蚀性溶剂。
3. 轴承必须与轴或座孔保持同心。

辅助工具

1. 不允许用锤子敲击轴承的端面。
2. 安装力必须直接和均匀地施加于所配合的套圈。如果所施加的力通过滑动球面传递，会损坏轴承(见图 4)。
3. 如果轴承同时安装进轴承座和轴，安装工具必须同时压住轴承内、外圈端面(见图 5)。
4. 较大的轴承必须用特殊的安装工具(见图 6)。

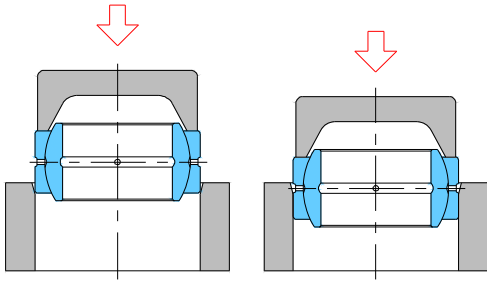


图 4 Figure4

Rules and guidelines

1. The assembly area must be kept clean and free from dust.
2. The bearings must be protected from.
3. The bearings must always be located concentrically.

Mechanical and thermal assistance

1. Direct blows using a hammer and drift on the end faces of the bearing rings must be avoided.
2. Fitting forces must always be applied to the inner ring. If these forces are directed through the sliding surfaces, the bearings may jam during fitting (Figure 4).
3. If bearings are fitted on the shaft and in a housing at the same time, fitting tools must be used which act simultaneously on the end faces of the inner and outer ring (Figure 5).
4. Larger bearings must be fitted using special fitting equipment (Figure 6).

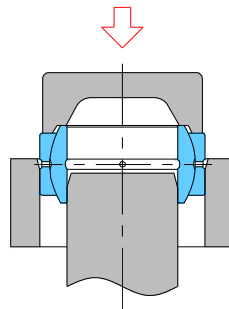


图 5 Figure5

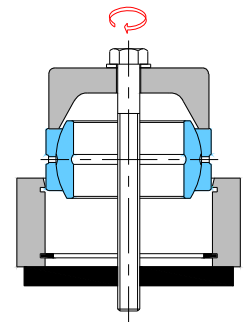


图 6 Figure6

加热辅助安装

当轴承不易安装时，可以在安装前对轴承或轴承座进行加热，但应注意：

1. 关节轴承不允许加热超过 130℃，较高温度会破坏密封圈。
2. 关节轴承不允许采用油浴加热安装，否则：
 - ① 对于自润滑轴承，油浴加热削弱了自润滑系统。
 - ② 对于钢对钢关节轴承，稀释了球面上的二硫化钼。
3. 关节轴承不允许用明火加热，否则：
 - ① 材料承受过多的局部热量，它的硬度会降低。此外轴承的应力会降低。
 - ② 密封圈熔化。
 - ③ 自润滑层破坏。

Thermal assistance

When bearing is difficultly mounted, bearing heating and bearing housing heating can be done before mounting, but took notice that.

1. Spherical plain bearings must not be heated above +130℃, higher temperatures damage the seals.
2. Spherical plain bearings must not be heated in an oil bath, unless:
 - ① This impairs the triological system of maintenance-free bearings.
 - ② It changes the molybdenum disulphide concentration on the surfaces in bearing with a steel/steel sliding contact surface.
3. Bearings must not be heated using a naked flame, unless:
 - ① The material undergoes excessive localized heating and its hardness is reduced. Furthermore, stresses are induced in the bearing.
 - ② The seals could melt.
 - ③ Maintenance-free sliding surfaces could be damaged.

冷却辅助安装

轴承安装也可以采用冷却方式,但应注意:

钢对钢向心关节轴承的套圈在 -61°C 时,组织会产生变化,可能使体积增大。由于公差的变化,轴承可能卡死。

套圈用胶粘剂固定

如果采用推荐的配合,没有必要使用胶粘剂固定套圈。当为使轴承易于安装而采用松配合时,应考虑轴与内圈、轴承座孔与外圈之间的固定方式,可以采用胶粘剂固定方式,但应注意,对于钢对钢向心关节轴承,胶粘剂只在以下情况下使用:

1. 安装表面必须清洁且没有油脂。
2. 必须确保润滑槽、孔不会被胶堵住。

Fitting by refrigeration

The cooling also can be used for bearing mounting, but took notice that.

The inner rings of spherical plain bearings with a steel/steel sliding contact surface undergo structural change at temperatures below -61°C .

Adhesive bonding of bearing rings

If the recommended fits are adhered to, it is not necessary to use adhesive on the bearing rings. In order to make it easy, the bearing is mounted with a loose fit, then the adhesive bonding is considered to be used for bonding shaft and inner ring, or bonding bearing housing and outer ring, but took notice that, adhesives may only be used on spherical plain bearings with steel/steel sliding contact surfaces under the following conditions:

1. The surfaces to be bonded must be clean and free from grease.
2. It must be insured that the lubricant ducts and lubricant holes are not blocked by adhesive.

角接触关节轴承的球面倾斜于轴承内径中心线，适合于承受径向和轴向的联合载荷，单套安装的角接触关节轴承只能承受单一方向的轴向载荷。当角接触关节轴承承受径向载荷时，会产生轴向分载荷。角接触关节轴承通常成对安装以形成一套可调游隙的向心关节轴承，这样就可以承受两个方向的轴向载荷。LS 角接触关节轴承的滑动摩擦副可由不同材料组成，主要有两种：钢对钢角接触关节轴承和自润滑角接触关节轴承。

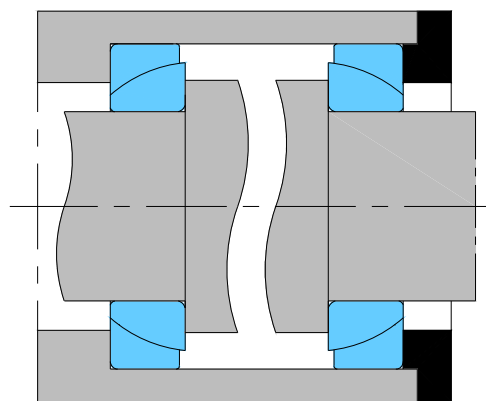
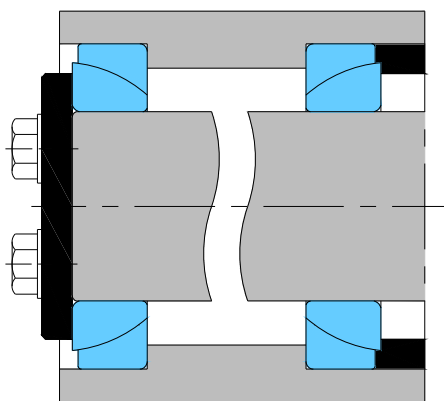
LS 钢对钢角接触关节轴承经过淬火，磷化和涂敷二硫化钼，具有耐磨损、抗腐蚀的特点。在正常情况下，周期性润滑是必须的。为了确保有效的润滑，外圈有润滑油槽油孔。由于滑动表面具有很高的强度，这种轴承特别适合于承受交变重载、冲击载荷和静态重载。

LS 自润滑角接触关节轴承滑动摩擦副是钢对 PTFE 编织物和钢对 PTFE 塑料，这类轴承具有较低的摩擦系数，工作中不需维护，一般情况下润滑都会降低轴承的使用寿命。它们应用于需要较长使用寿命或工作中无法润滑的机械机构中，适合于承受恒定方向重载。

The sphered sliding contact surfaces of angular contact spherical plain bearings are inclined at an angle to the bearing axis. They are therefore particularly suitable for carrying combined (radial and axial) loads. A single angular contact spherical plain bearing can only accept axial loads acting in one direction. Under radial loads, a force acting in the axial direction is produced in the bearing which must always be opposed by an equal force acting in the opposite direction. Therefore, the bearings are usually adjusted against a second bearing. When two angular contact spherical plain bearings are arranged so that their sphere centres coincide, a clearance-free radial spherical plain bearing is obtained which can accommodate heavy radial loads as well as heavy axial loads in both directions. LS angular contact spherical plain bearings are available with different sliding contact surface combinations, i.e. the sliding surfaces of inner and outer rings are made from different materials. There are two main groups: steel-on-steel angular contact spherical plain bearings and maintenance-free angular contact spherical plain bearings.

LS steel-on-steel angular contact spherical plain bearings are made of carbon chromium steel and are hardened and phosphated, it has characteristics of wear-resistance and wear-corrosion. The inner and outer rings sliding contact surface are treated with molybdenum disulphide. Bearings with this sliding contact surface combination require regular relubrication. To facilitate efficient lubrication, outer ring has an annular groove and two lubrication holes. The high strength of the sliding surfaces makes these bearings especially suitable for bearing arrangements where heavy loads of alternating direction, shock loads or heavy static loads have to be accommodated.

LS maintenance-free angular contact spherical plain bearings have sliding contact surface combinations steel-on-PTFE fabric and steel-on-PTFE plastic, they have very low friction and can be operated without maintenance, any lubrication of the sliding contact surfaces will shorten bearing life. They are used for applications where long bearing lives are required without maintenance, or where operating conditions, such as inadequate lubrication or the absence of lubrication make the use of steel-on-steel bearing inadvisable. The maintenance-free bearings are primarily intended for applications where loads are heavy and have a constant direction.



角接触关节轴承公差

Tolerances for angular contact spherical plain bearings

内圈和轴承宽度 Inner ring and width of bearing

d mm		Δd_{mp} μm		V _{dp} μm	V _{dmp} μm	ΔB_s μm		ΔT_s μm	
超过 over	到 incl.	max	min	max	max	max	min	max	min
—	50	0	-12	12	9	0	-240	+250	-400
50	80	0	-15	15	11	0	-300	+250	-500
80	120	0	-20	20	15	0	-400	+250	-600
120	180	0	-25	25	19	0	-500	+350	-700
180	200	0	-30	30	23	0	-600	+350	-800

外圈 Outer ring

D mm		ΔD_{mp} μm		V _{Dp} μm	V _{Dmp} μm	ΔC_s μm	
超过 over	到 incl.	max	min	max	max	max	min
—	50	0	-14	14	11	0	-240
50	80	0	-16	16	12	0	-300
80	120	0	-18	18	14	0	-400
120	150	0	-20	20	15	0	-500
150	180	0	-25	25	19	0	-500
180	250	0	-30	30	23	0	-600
250	315	0	-35	35	26	0	-700

尺寸和公差符号说明详见 P25

Details of dimension and tolerance symbols see page 25

角接触关节轴承配合

Fits of angular contact spherical plain bearings

轴配合 Shaft fits

工作条件 Operating conditions	滑动摩擦副 Sliding contact surface combination	
	润滑型 requiring maintenance	自润滑型 maintenance-free
各种载荷 过盈配合 Loads of all kinds, interference fit	m6	m6

支承座配合 Housing fits

工作条件 Operating conditions	滑动摩擦副 Sliding contact surface combination	
	润滑型 requiring maintenance	自润滑型 maintenance-free
各种载荷 过盈配合 Loads of all kinds, interference fit	M7	M7
各种载荷 可轴向移动 Loads of all kinds, can generally be displaced axially	J7	J7

轴径公差 Shaft diameter tolerances

轴径 Shaft diameter mm		轴径公差 Shaft diameter tolerances μm	
		m6	
超过 over	到 incl.	high	low
—	30	+21	+8
30	50	+25	+9
50	80	+30	+11
80	120	+35	+13
120	180	+40	+15
180	250	+46	+17

支承座孔公差 Housing bore tolerances

支承座孔径 Housing bore diameter		支承座孔公差 Housing bore tolerances			
mm		J7		M7	
超过 over	到 incl.	low	high	low	high
—	50	-11	+14	-25	0
50	80	-12	+18	-30	0
80	120	-13	+22	-35	0
120	150	-14	+26	-40	0
150	180	-14	+26	-40	0
180	250	-16	+30	-46	0
250	315	-16	+36	-52	0



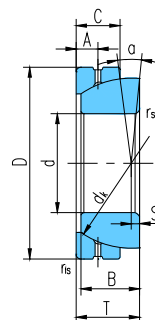
角接触关节轴承

Angular Contact Spherical Plain Bearings



滑动摩擦副：钢 / 钢

Sliding contact surfaces: Steel / Steel



轴承 型号 Bearing number	外形尺寸 Dimensions										额定载荷 Load ratings kN		重量 Weight ≈kg
	d	D	B	C	T	d _k	S	A	r _s , r _{1s} max	α° ≈	动载荷 Dynamic	静载荷 Static	
GACZ12S	12.7	22.225	6.86	4.83	7.62	18.26	1.3	2.39	0.51	7	6	18	0.013
	0.5	0.875	0.27	0.19	0.3	0.719	0.051	0.094	0.02				
GACZ15S	15.875	26.988	8.64	6.35	9.40	22.83	1.48	2.77	0.76	6	10	31	0.025
	0.625	1.0625	0.34	0.25	0.37	0.899	0.058	0.109	0.03				
GACZ19S	19.05	31.75	10.41	7.87	11.18	27.43	1.79	3.18	1	6	16	47	0.038
	0.75	1.25	0.41	0.31	0.44	1.08	0.07	0.125	0.04				
GACZ22S	22.225	36.512	12.19	9.65	13.21	31.95	2.02	4.37	2	5.5	22	66	0.049
	0.875	1.4375	0.48	0.38	0.52	1.258	0.08	0.172	0.08				
GACZ25S	25.4	41.275	13.97	11.18	15.24	36.50	2.54	5.16	2	6	29	87	0.085
	1	1.625	0.55	0.44	0.6	1.437	0.1	0.203	0.08				
GACZ31S	31.75	50.8	17.78	13.97	18.80	45.59	3.36	5.94	2	6	47	142	0.159
	1.25	2	0.7	0.55	0.74	1.795	0.132	0.234	0.08				
GACZ34S	34.925	55.562	19.56	15.24	21.34	49.20	3.69	7.14	2.54	4	53	159	0.213
	1.375	2.1875	0.77	0.6	0.84	1.937	0.145	0.281	0.1				
GACZ38S	38.1	61.912	21.34	16.76	23.11	54.74	3.93	7.92	2.54	5.5	66	197	0.301
	1.5	2.4375	0.84	0.66	0.91	2.155	0.155	0.312	0.1				
GACZ44S	44.45	71.438	24.89	20.07	27.18	63.88	4.72	8.33	2.54	6	91	273	0.458
	1.75	2.8125	0.98	0.79	1.07	2.515	0.186	0.328	0.1				
GACZ50S	50.8	80.962	28.70	23.37	31.24	73.02	5.51	9.52	3.56	5.5	122	365	0.671
	2	3.1875	1.13	0.92	1.23	2.875	0.217	0.375	0.14				
GACZ57S	57.15	90.488	32.26	26.67	35.31	82.17	6.18	11.51	3.56	5.5	155	466	0.948
	2.25	3.5625	1.27	1.05	1.39	3.235	0.243	0.453	0.14				
GACZ63S	63.5	100.013	36.07	29.97	39.12	91.19	6.79	12.7	3.56	5	196	589	1.13
	2.5	3.9375	1.42	1.18	1.54	3.59	0.267	0.5	0.14				
GACZ69S	69.85	111.125	39.62	32.38	43.18	100.33	7.46	13.08	4.6	5	231	694	1.75
	2.75	4.375	1.56	1.275	1.7	3.95	0.294	0.515	0.18				
GACZ76S	76.2	120.65	43.43	35.69	47.24	109.52	8.17	14.68	4.6	5	279	838	2.28
	3	4.75	1.71	1.405	1.86	4.312	0.322	0.578	0.18				
GACZ82S	82.55	130.175	47.24	39.24	51.56	118.74	9.04	16.66	4.6	5	332	995	2.89
	3.25	5.125	1.86	1.545	2.03	4.675	0.356	0.656	0.18				
GACZ88S	88.9	139.7	50.80	42.54	55.37	128.02	9.51	17.86	4.6	5	389	1167	3.57
	3.5	5.5	2	1.675	2.18	5.04	0.374	0.703	0.18				
GACZ95S	95.25	149.225	54.61	45.85	59.44	136.91	10.1	19.43	4.6	4.5	449	1348	4.35
	3.75	5.875	2.15	1.805	2.34	5.39	0.398	0.765	0.18				
GACZ101S	101.6	158.75	58.42	49.15	63.50	146.05	10.4	19.84	4.6	4.5	515	1545	5.26
	4	6.25	2.3	1.935	2.5	5.75	0.409	0.781	0.18				
GACZ114S	114.3	177.8	65.79	55.75	71.12	164.46	12.4	22.22	4.6	4.5	663	1990	7.76
	4.5	7	2.59	2.195	2.8	6.475	0.488	0.875	0.18				
GACZ127S	127	196.85	73.15	62.36	79.50	182.63	13.9	25.4	4.6	4.5	818	2455	11.07
	5	7.75	2.88	2.455	3.13	7.19	0.547	1	0.18				
GACZ152S	152.4	222.25	78.74	66.42	85.72	207.16	16.1	34.8	4.6	4.5	985	2955	17.37
	6	8.75	3.1	2.615	3.375	8.156	0.634	1.37	0.18				

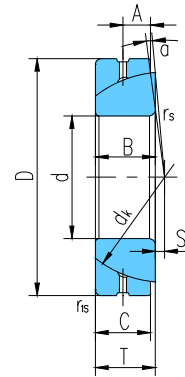


角接触关节轴承 Angular Contact Spherical Plain Bearings



滑动摩擦副：钢 / 钢

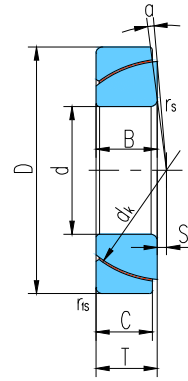
Sliding contact surfaces: Steel / Steel



轴承 型号 Bearing number	外形尺寸 Dimensions mm										额定载荷 Load ratings kN		重量 Weight ≈kg
	d	D	B	C	T	dk	S	A	r_{fs}, r_{1s} min	α° ≈	动载荷 Dynamic	静载荷 Static	
GAC25S	25	47	15	14	15	42	0.6	7.5	1	2.5	50	250	0.148
GAC28S	28	52	15	15	16	47	1	8	1	2	60	300	0.186
GAC30S	30	55	17	15	17	49.5	1.3	8.5	1	4.5	63	315	0.208
GAC32S	32	58	17	16	17	52	2	8.5	1	2	71	354	0.241
GAC35S	35	62	18	16	18	55.5	2.1	9	1	4	78	390	0.268
GAC40S	40	68	19	17	19	62	2.8	9.5	1	3.5	92	463	0.327
GAC45S	45	75	20	18	20	68.5	3.5	10	1	3	108	540	0.416
GAC50S	50	80	20	19	20	74	4.3	10	1	1.5	123	618	0.455
GAC55S	55	90	23	20	23	82	5	11.5	1.1	4	144	721	0.645
GAC60S	60	95	23	21	23	88.5	5.7	11.5	1.1	2.5	163	817	0.714
GAC65S	65	100	23	22	23	93.5	6.5	11.5	1.1	1	180	905	0.759
GAC70S	70	110	25	23	25	102	7.2	12.5	1.1	2	206	1030	1.04
GAC75S	75	115	25	24	25	107	7.9	12.5	1.1	1	220	1129	1.12
GAC80S	80	125	29	25.5	29	115	8.6	14.5	1.1	3.5	258	1290	1.54
GAC85S	85	130	29	26.5	29	122	9.4	14.5	1.1	2	284	1422	1.61
GAC90S	90	140	32	28	32	128.5	10.1	16	1.5	3.5	316	1580	2.09
GAC95S	95	145	32	29.5	32	135	10.8	16	1.5	2	350	1750	2.22
GAC100S	100	150	32	31	32	141	11.6	16	1.5	0.5	384	1923	2.34
GAC105S	105	160	35	32.5	35	148	12.3	17.5	2	2	423	2116	2.93
GAC110S	110	170	38	34	38	155	13	19	2	3	463	2318	3.68
GAC120S	120	180	38	37	38	168	14.5	19	2	0.5	547	2735	3.97
GAC130S	130	200	45	43	45	188	18	19	2.5	1	710	3550	5.92
GAC140S	140	210	45	43	45	198	19	19	2.5	1	740	3740	6.33
GAC150S	150	225	48	46	48	211	20	20.5	3	1	850	4270	8.01
GAC160S	160	240	51	49	51	225	20	22	3	1	970	4850	9.79
GAC170S	170	260	57	55	57	246	21	27	3	1	1190	5950	12.3
GAC180S	180	280	64	61	64	260	21	28	3	1	1395	6970	17.4
GAC190S	190	290	64	62	64	275	26	30	3	0.5	1500	7500	18.2
GAC200S	200	310	70	66	70	290	26	30	3	1.5	1680	8420	23.8



角接触关节轴承 Angular Contact Spherical Plain Bearings



滑动摩擦副：钢 / PTFE 编织物

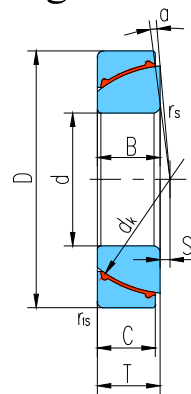
Sliding contact surfaces: Steel / PTFE fabric

轴承 型号 Bearing number	外形尺寸 Dimensions mm									额定载荷 Load ratings kN		重量 Weight ≈kg
	d	D	B	C	T	d_k	S	r_s, r_{1s} min	α° ≈	动载荷 Dynamic	静载荷 Static	
GAC25T	25	47	15	14	15	42	0.6	1	2.5	89	225	0.148
GAC28T	28	52	15	15	16	47	1	1	2	100	270	0.186
GAC30T	30	55	17	15	17	49.5	1.3	1	4.5	110	285	0.208
GAC32T	32	58	17	16	17	52	2	1	2	125	320	0.241
GAC35T	35	62	18	16	18	55.5	2.1	1	4	135	340	0.268
GAC40T	40	68	19	17	19	62	2.8	1	3.5	160	400	0.327
GAC45T	45	75	20	18	20	68.5	3.5	1	3	190	470	0.416
GAC50T	50	80	20	19	20	74	4.3	1	1.5	215	540	0.455
GAC55T	55	90	23	20	23	82	5	1.1	4	250	630	0.645
GAC60T	60	95	23	21	23	88.5	5.7	1.1	2.5	285	710	0.714
GAC65T	65	100	23	22	23	93.5	6.5	1.1	1	315	790	0.759
GAC70T	70	110	25	23	25	102	7.2	1.1	2	360	900	1.04
GAC75T	75	115	25	24	25	107	7.9	1.1	1	395	980	1.12
GAC80T	80	125	29	25.5	29	115	8.6	1.1	3.5	450	1120	1.54
GAC85T	85	130	29	26.5	29	122	9.4	1.1	2	495	1240	1.61
GAC90T	90	140	32	28	32	128.5	10.1	1.5	3.5	550	1380	2.09
GAC95T	95	145	32	29.5	32	135	10.8	1.5	2	610	1530	2.22
GAC100T	100	150	32	31	32	141	11.6	1.5	0.5	670	1680	2.34
GAC105T	105	160	35	32.5	35	148	12.3	2	2	740	1850	2.93
GAC110T	110	170	38	34	38	155	13	2	3	810	2020	3.68
GAC120T	120	180	38	37	38	168	14.5	2	0.5	955	2390	3.97
GAC130T	130	200	45	43	45	188	18	2.5	1	1240	3110	5.92
GAC140T	140	210	45	43	45	198	19	2.5	1	1310	3270	6.33
GAC150T	150	225	48	46	48	211	20	3	1	1490	3730	8.01
GAC160T	160	240	51	49	51	225	20	3	1	1690	4240	9.79
GAC170T	170	260	57	55	57	246	21	3	1	2080	5200	12.3
GAC180T	180	280	64	61	64	260	21	3	1	2440	6100	17.4
GAC190T	190	290	64	62	64	275	26	3	0.5	2620	6560	18.2
GAC200T	200	310	70	66	70	290	26	3	1.5	2940	7360	23.8



角接触关节轴承

Angular Contact Spherical Plain Bearings



滑动摩擦副：钢 / PTFE 塑料

Sliding contact surfaces: Steel / PTFE plastic

轴承 型号 Bearing number	外形尺寸 Dimensions mm									额定载荷 Load ratings kN		重量 Weight ≈kg
	d	D	B	C	T	d _k	S	r _s , r _{is} min	α° ≈	动载荷 Dynamic	静载荷 Static	
GAC25N	25	47	15	14	15	42	0.6	1	2.5	20	32	0.148
GAC30N	30	55	17	15	17	49.5	1.3	1	4.5	26	41	0.208
GAC35N	35	62	18	16	18	55.5	2.1	1	4	31	49	0.268
GAC40N	40	68	19	17	19	62	2.8	1	3.5	36	59	0.327
GAC45N	45	75	20	18	20	68.5	3.5	1	3	43	69	0.416
GAC50N	50	80	20	19	20	74	4.3	1	1.5	49	78	0.455
GAC60N	60	95	23	21	23	88.5	5.7	1.1	2.5	65	104	0.714
GAC70N	70	110	25	23	25	102	7.2	1.1	2	82	131	1.04
GAC80N	80	125	29	25.5	29	115	8.6	1.1	3.5	102	164	1.54
GAC90N	90	140	32	28	32	128.5	10.1	1.5	3.5	125	201	2.09
GAC100N	100	150	32	31	32	141	11.6	1.5	0.5	152	244	2.34
GAC110N	110	170	38	34	38	155	13	2	3	184	295	3.68
GAC120N	120	180	38	37	38	168	14.5	2	0.5	217	348	3.97

推力关节轴承的滑动面倾斜于轴承内径中心线，主要用于承受单一方向轴向载荷，也可以承受一定大小的联合载荷。LS 推力关节轴承的滑动摩擦副可由不同材料组成，主要有两种：钢对钢推力关节轴承和自润滑推力关节轴承。

LS 钢对钢推力关节轴承轴圈和座圈经过淬火，磷化和涂敷二硫化钼，具有耐磨损、抗腐蚀的特点。在正常情况下，周期性润滑是必须的。为了确保有效的润滑，座圈有润滑油槽油孔。由于滑动表面具有很高的强度，这种轴承特别适合于承受交变重载、冲击载荷和静态重载。

LS 自润滑推力关节轴承滑动摩擦副是钢对 PTFE 编织物和钢对 PTFE 塑料，这类轴承具有较低的摩擦系数，工作中不需维护，一般情况下润滑都会降低轴承的使用寿命。它们应用于需要较长使用寿命或工作中无法润滑的机械结构中，适合于承受恒定重载。

Spherical plain thrust bearings have sliding contact surfaces in the shaft and housing washers which are arranged at an angle to the bearing axis. They are primarily intended for axial loads although they can accommodate combined loads to a certain extent. LS spherical plain thrust bearings are available with different sliding contact surface combinations, i.e. the sliding surfaces of shaft and housing washers are made from different materials. There are two main group: steel-on-steel spherical plain thrust bearings and maintenance-free spherical plain thrust bearings.

LS steel-on-steel spherical plain thrust bearings are made of carbon chromium steel and are hardened and phosphated, the shaft and housing washers sliding contact surface are treated with molybdenum disulphide, it has characteristics of wear-resistance and wear-corrosion. Bearings with this sliding contact surface combination require regular relubrication. To facilitate efficient lubrication, housing washer have an annular groove and a lubrication hole. The high wear resistance of the sliding surfaces makes these bearings especially suitable for bearing arrangements where heavy loads of alternating direction, shock loads or heavy static loads have to be accommodated.

LS maintenance-free spherical plain thrust bearings have sliding contact surface combinations steel-on-PTFE fabric and steel-on-PTFE plastic, they have very low friction and can be operated without maintenance, any lubrication of the sliding contact surfaces will shorten bearing life. They are used for applications where long bearing lives are required without maintenance, or where operating conditions, such as inadequate lubrication or the absence of lubrication make the use of steel-on-steel bearing inadvisable. The maintenance-free bearings are primarily intended for applications where loads are heavy and have a constant direction.

推力关节轴承公差

Tolerances for spherical plain thrust bearings

轴圈和轴承高度 Shaft washer and height of bearing

d mm		Δdmp μm		Vdp μm	$Vdmp$ μm	ΔBs μm		ΔHs μm	
超过 over	到 incl.	max	min	max	max	max	min	max	min
—	18	0	-8	8	6	0	-240	+250	-400
18	30	0	-10	10	8	0	-240	+250	-400
30	50	0	-12	12	9	0	-240	+250	-400
50	80	0	-15	15	11	0	-300	+250	-500
80	120	0	-20	20	15	0	-400	+250	-600
120	180	0	-25	25	19	0	-500	+350	-700
180	200	0	-30	30	23	0	-600	+350	-800
200	250	0	-35	35	26	0	-700	+350	-800
250	315	0	-35	35	26	0	-700	+350	-800
315	400	0	-40	40	30	0	-800	+350	-800

座圈 Housing washer

D mm		ΔDmp μm		VDp μm	$VDmp$ μm	ΔCs μm	
超过 over	到 incl.	max	min	max	max	max	min
—	30	0	-9	12	7	0	-240
30	50	0	-11	15	8	0	-240
50	80	0	-13	17	10	0	-300
80	120	0	-15	20	11	0	-400
120	150	0	-18	24	14	0	-500
150	180	0	-25	33	19	0	-500
180	250	0	-30	40	23	0	-600
250	315	0	-35	47	26	0	-700
315	340	0	-40	53	30	0	-800
340	400	0	-40	53	30	0	-800
400	500	0	-45	60	34	0	-800
500	630	0	-50	67	38	0	-800

尺寸和公差符号说明详见 P25

Details of dimension and tolerance symbols see page 25

推力关节轴承配合

Fits of spherical plain thrust bearings

轴配合 Shaft fits

工作条件 Operating conditions	滑动摩擦副 Sliding contact surface combination	
	润滑型 requiring maintenance	自润滑型 maintenance-free
各种载荷 过盈配合 Loads of all kinds, interference fit	m6	m6

支承座配合 Housing fits

工作条件 Operating conditions	滑动摩擦副 Sliding contact surface combination	
	润滑型 requiring maintenance	自润滑型 maintenance-free
纯轴向载荷 Purely axial loads	H11	H11
联合载荷 Combined loads	J7	J7

轴径公差 Shaft diameter tolerances

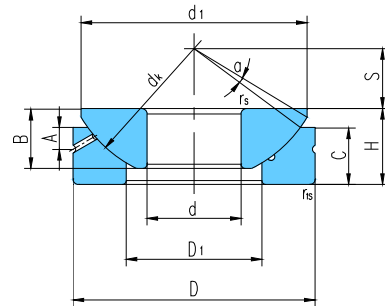
轴径 Shaft diameter mm		轴径公差 Shaft diameter tolerances um	
		m6	
超过 over	到 incl.	high	low
6	10	+15	+6
10	18	+18	+7
18	30	+21	+8
30	50	+25	+9
50	80	+30	+11
80	120	+35	+13
120	180	+40	+15
180	250	+46	+17
250	315	+52	+20
315	400	+57	+21

支承座孔公差 Housing bore tolerances

支承座孔径 Housing bore diameter mm		支承座孔公差 Housing bore tolerances um			
		H11		J7	
超过 over	到 incl.	low	high	low	high
18	30	0	+130	-9	+12
30	50	0	+160	-11	+14
50	80	0	+190	-12	+18
80	120	0	+220	-13	+22
120	150	0	+250	-14	+26
150	180	0	+250	-14	+26
180	250	0	+290	-16	+30
250	315	0	+320	-16	+36
315	400	0	+360	-18	+39
400	500	0	+400	-20	+43
500	630	0	+440	-	-



推力关节轴承 Thrust Spherical Plain Bearings



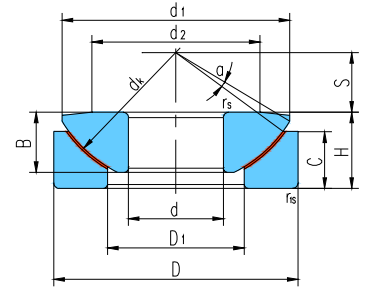
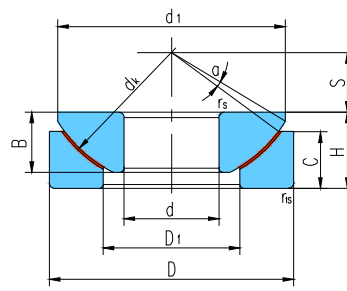
滑动摩擦副：钢 / 钢

Sliding contact surfaces: Steel / Steel

轴承 型号 Bearing number	外形尺寸 Dimensions mm												额定载荷 Load ratings kN		重量 Weight ≈kg
	d	D	B	C	H	d _k	S	d ₁ max	D ₁ min	A	r _s , r ₁ min	α° ≈	动载荷 Dynamic	静载荷 Static	
GX10S	10	30	7.5	7	9.5	32	7	27.5	15.5	3	0.6	5	27	136	0.036
GX12S	12	35	9.5	9.3	13	38	8	32	18	4	0.6	5	37	188	0.072
GX15S	15	42	11	10.8	15	46	10	39	22.5	5	0.6	6	53	267	0.108
GX17S	17	47	11.8	11.2	16	52	11	43.5	27	5	0.6	4	61	311	0.137
GX20S	20	55	14.5	13.8	20	60	12.5	50	31	6	1	5	84	425	0.246
GX25S	25	62	16.5	16.7	22.5	68	14	58.5	34.5	6	1	5	134	672	0.415
GX30S	30	75	19	19	26	82	17.5	70	42	8	1	5	182	909	0.614
GX35S	35	90	22	20.7	28	98	22	84	50.5	8	1	5	266	1330	0.973
GX40S	40	105	27	21.5	32	114	24.5	97	59	9	1	6	357	1810	1.59
GX45S	45	120	31	25.5	36.5	128	27.5	110	67	11	1	6	486	2470	2.24
GX50S	50	130	33	30.5	42.5	139	30	120	70	10	1	6	554	2810	3.14
GX60S	60	150	37	34	45	160	35	140	84	12.5	1	6	748	3820	4.63
GX70S	70	160	42	36.5	50	176	35	153	94.5	13.5	1	3	902	4610	5.37
GX80S	80	180	43.5	38	50	197	42.5	172	107.5	14.5	1	4	1110	5700	6.91
GX100S	100	210	51	46	59	222	45	198	127	15	1.1	4	1300	6470	11
GX120S	120	230	53.5	50	64	250	52.5	220	145	16.5	1.1	3	1530	7580	14
GX140S	140	260	61	54	72	274	52.5	243	177	23	1.5	3	1820	9040	19.1
GX160S	160	290	66	58	77	313	65	271	200	23	1.5	2	2100	10440	25
GX180S	180	320	74	62	86	340	67.5	299	225	26	1.5	4	2430	12070	32.8
GX200S	200	340	80	66	87	365	70	320	247	27	1.5	1	3070	15280	35.4



推力关节轴承 Thrust Spherical Plain Bearings



滑动摩擦副：钢 / PTFE 编织物

$d \leq \phi 200$

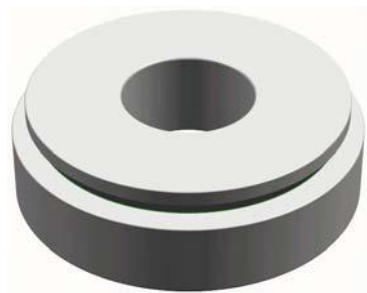
$d > \phi 220$

Sliding contact surfaces: Steel / PTFE fabric

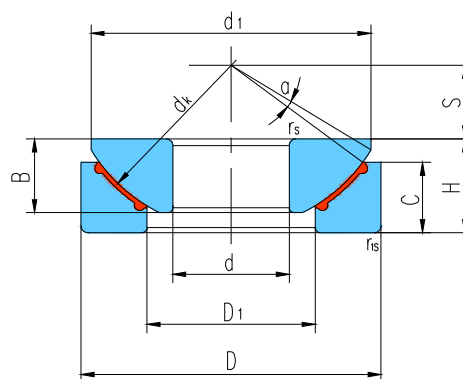
轴承 型号 Bearing number	外形尺寸 Dimensions mm												额定载荷 Load ratings kN		重量 Weigh ≈kg
	d	D	B	C	H	dk	S	d1 max	d2	D1 min	rs, r1s min	α° ≈	动载荷 Dynamic	静载荷 Static	
GX10T	10	30	7.5	7	9.5	32	7	27.5		15.5	0.6	5	45	120	0.036
GX12T	12	35	9.5	9.3	13	38	8	32		18	0.6	5	65	165	0.072
GX15T	15	42	11	10.8	15	46	10	39		22.5	0.6	6	95	235	0.108
GX17T	17	47	11.8	11.2	16	52	11	43.5		27	0.6	4	110	275	0.137
GX20T	20	55	14.5	13.8	20	60	12.5	50		31	1	5	150	380	0.246
GX25T	25	62	16.5	16.7	22.5	68	14	58.5		34.5	1	5	245	600	0.415
GX30T	30	75	19	19	26	82	17.5	70		42	1	5	335	820	0.614
GX35T	35	90	22	20.7	28	98	22	84		50.5	1	5	490	1200	0.973
GX40T	40	105	27	21.5	32	114	24.5	97		59	1	6	675	1640	1.59
GX45T	45	120	31	25.5	36.5	128	27.5	110		67	1	6	915	2240	2.24
GX50T	50	130	33	30.5	42.5	139	30	120		70	1	6	1040	2550	3.14
GX60T	60	150	37	34	45	160	35	140		84	1	6	1360	3470	4.63
GX70T	70	160	42	36.5	50	176	35	153		94.5	1	3	1640	4180	5.37
GX80T	80	180	43.5	38	50	197	42.5	172		107.5	1	4	2030	5180	6.91
GX100T	100	210	51	46	59	222	45	198		127	1.1	4	2230	5940	11
GX120T	120	230	53.5	50	64	250	52.5	220		145	1.1	3	2610	6960	14
GX140T	140	260	61	54	72	274	52.5	243		177	1.5	3	3120	8300	19.1
GX160T	160	290	66	58	77	313	65	271		200	1.5	2	3380	9560	25
GX180T	180	320	74	62	86	340	67.5	299		225	1.5	4	3910	11050	32.8
GX200T	200	340	80	66	87	365	70	320		247	1.5	1	4950	13990	35.4
GX220T	220	370	82	67	97	388	75	350	289	265	1.5	7	4640	13110	44.7
GX240T	240	400	87	73	103	420	77.5	382	314	294	1.5	6	5500	15560	56.9
GX260T	260	430	95	80	115	449	82.5	409	336	317	1.5	7	6190	17510	71.3
GX280T	280	460	100	85	110	480	80	445	366	337	3	4	8280	23400	84.7
GX300T	300	480	100	90	110	490	80	460	388	356	3	3.5	9010	25480	88.9
GX320T	320	520	105	91	116	540	95	500	405	380	4	4	11360	33260	111
GX340T	340	540	105	91	116	550	95	510	432	380	4	4	11570	33880	117
GX360T	360	560	115	95	125	575	95	535	452	400	4	4	12850	37630	132



推力关节轴承 Thrust Spherical Plain Bearings



滑动摩擦副：钢 / PTFE 塑料



Sliding contact surfaces: Steel / PTFE plastic

轴承型号 Bearing number	外形尺寸 Dimensions											额定载荷 Load ratings		重量 Weight ≈kg
	d	D	B	C	H	d_k	S	d_1 max	D_1 min	r_s, r_{1s} min	α° ≈	动载荷 Dynamic	静载荷 Static	
GX17N	17	47	11.8	11.2	16	52	11	43.5	27	0.6	4	32	52	0.137
GX20N	20	55	14.5	13.8	20	60	12.5	50	31	1	5	44	71	0.246
GX25N	25	62	16.5	16.7	22.5	68	14	58.5	34.5	1	5	65	104	0.415
GX30N	30	75	19	19	26	82	17.5	70	42	1	5	88	141	0.614
GX35N	35	90	22	20.7	28	98	22	84	50.5	1	5	129	207	0.973
GX40N	40	105	27	21.5	32	114	24.5	97	59	1	6	169	270	1.59
GX45N	45	120	31	25.5	36.5	128	27.5	110	67	1	6	230	368	2.24
GX50N	50	130	33	30.5	42.5	139	30	120	70	1	6	262	420	3.14
GX60N	60	150	37	34	45	160	35	140	84	1	6	374	599	4.63
GX70N	70	160	42	36.5	50	176	35	153	94.5	1	3	451	722	5.37
GX80N	80	180	43.5	38	50	197	42.5	172	107.5	1	4	558	893	6.91
GX100N	100	210	51	46	59	222	45	198	127	1.1	4	717	1140	11
GX120N	120	230	53.5	50	64	250	52.5	220	145	1.1	3	839	1340	14