XUZHOU HAILIN SLEWING BEARING CO.,LTD.

徐州海林回转支承有限公司

产品使用说明书

Installation and Maintenance Instruction

一、产品说明

回转支承广泛用于工程机械、港口机械、冶金、环保等行业，能够同时承受轴向力、径向力和倾覆力矩，结构紧凑，性能可靠。主要结构型式有单排四点接触球式、双排球式、交叉滚柱式、三排滚柱式。

二、标识

A.标牌:位于回转支承的外圈或内圈内孔上，标注回转支承的型号、产品标号、生产厂家等。

B.标记：回转支承淬火软带用“S”标记，打在非安装基面上（有堵塞的位于堵塞孔处），安装时软带应置于非符经常负荷区。齿圈齿轮三个齿跳最大的齿，用于红色或绿色漆标记。安装时与小齿轮的齿侧间隙在该处调整。

三、安装

1、安装支架要求

⑴回转支承安装基面与安装平台都必须清理干净、防止留有杂物、焊渣等影响安装精度。

⑵安装支架必须有足够的刚性，防止回转支承变形，影响其性能。

⑶安装支架焊后应进行消除内应力热处理，平面进行机械加工。

⑷平面偏差只允许逐步下降或上升，不准忽降忽升，以避免峰值负荷。

2、安装

⑴将回转支承水平吊放在支座上用塞尺检查支承平面与支座安装面得接触情况，如有间隙可以采用局部垫平，以防螺栓拧紧后支承变形。

⑵安装时，回转支承淬火软带应置于非负荷区或非经常负荷区。

⑶调整齿轮啮合，确保大齿轮齿圈跳动的最高点（三个涂有红色或绿色漆标记齿）处得啮合间隙符合设计精度要求。

⑷回转支承安装螺栓应采用高强度螺栓，强度等级按设计要求。

⑸安装螺栓垫圈应选用调质平垫圈,禁止使用弹簧垫圈。

⑹安装螺栓应有足够的预紧力为螺栓材料的屈服极限的 0.7 倍。

⑺安装时应使用力矩扳手。实际预紧扭矩或预紧力见下表：

螺栓规格（GB5782-86 GB5783-86）	安装孔直径（mm）	螺栓强度等级（GB3098. 1-82）		
		8.8	10.9	12.9
		螺栓材料的强度极限 smin(N/mm2)		
		640	900	1080
		预紧扭矩 MA(Nm)		
M10	11	44	62	75
M12	13.5	77.5	110	130
M14	15.5	120	170	210
M16	18	190	265	320

M18	20	260	365	435
M20	22	370	520	620
M22	24	500	700	840
M24	26	640	900	1080
M27	30	950	1350	1620
M30	33	1300	1800	2160
		预紧力 FA（10 3 N）		
M33	36	293	421	495
M36	39	344	484	581
M39	42	414	581	698
M42	45	473	665	798
M45	48	553	777	932
M48	52	623	876	1050
M52	56	749	1054	1265
M56	62	863	1214	1457
M60	66	1008	1418	1621

注：MA=0.9Msp(许用夹紧扭矩)

FA=0.9Fsp(许用夹紧力)

螺栓夹紧长度 LK=5d(螺栓直径)

螺母的强度等级按 GB3098.2-82 标准中的规定，可以比螺栓强度低一级。

⑺拧紧安装螺栓应在 180° 方向对称的连续进行，直到全部拧紧。保证圆周上的螺栓相同的预紧力。

4、安置后

⑴检查齿轮是否干涉。

⑵确认螺栓是否拧紧。

⑶确定运转是否正常。

四、使用保养

1.回转支承出厂时滚道内涂有少量的 2 号极压锂基脂（GB7324-1994）。

使用时用户应根据不同的工作条件，重新充满新的润滑脂。

2.在一般条件下，回转支承每运转 60 小时润滑一次，在热带、湿度大、灰尘多、温度变化大的地区及连续运转的情况下，应加大润滑频次,机器长期停止运转的前后也必须加足新的润滑脂,注油脂时慢慢转动回转支承，使润滑脂填充均匀。

3.齿面应根据工作环境定期更换润滑脂。

4.回转支承运转 100 小时后，应检查螺母预紧力,一般每运转 500 小时检查一次，必须保持足够的预紧力,一般每 7 年或工作 14000 小时之后，要更换螺栓。

5. 使用中应注意回转支承的运行情况，如发现噪音，冲击，功率突然增大，应立刻停机检查，排除故障，必要时须拆检。

6. 使用中防止回转支承受到阳光直接暴晒, 禁止用水直接冲刷回转支承，以防水进入滚道，严防较硬物接近或进入齿啮合区。

7. 经常查看密封的完好情况，如发现密封带破损应及时更换，如发现脱落应及时复位。

五、保管

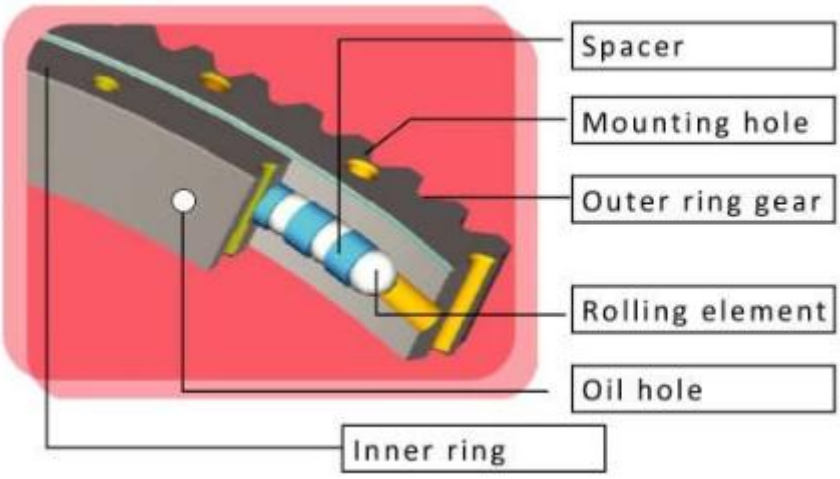
1. 回转支承出厂时进行了油封包装。包装好的回转支承可以在适宜的条件下存放 6 个月。存放支承滚道每 12 个月更换润滑脂；存放支承每隔 6 个月要重新防锈包装。

2. 在存放支承时，应放置在干燥平坦的地方，且应水平放置。一般禁止露天直接摆放，避免潮湿、有腐蚀性的环境，以避免回转支承受到环境影响而锈蚀。

Slewing Bearing Introduction

Thanks for choosing “XUZHOU HELIN “ brand slewing bearing, our products execute the Machinery Industry Standard of P. R.C JB/T2300-2011 standard, please read this manual carefully before installing and operating our products.

Standard design slewing bearing are suitable for operating temperature ranging from -20 ℃ to 60 ℃



1. Transportation and storage

Transport pallets with forklift or crane horizontally and make sure they cannot slip away, never transport slewing bearing vertically without any steel bracket.

As supplied slewing bearings are packaged for storage in a covered store and for a period not exceeding six months, light surface corrosion can usually be removed from exterior surface and it is more important that the raceway is well greased and dust free, in extreme cases after long term storage bearings may need professionally reconditioning before installation.

2. Installation preparation

2.1 Unpacking slewing bearing

Unpack the slewing bearing carefully, do not damage the internal seals

2.2 Mounting structure requirement for slewing bearing

The thickness of the supporting plates should be no less than that indicated below –which is offered as a rough approximation only.

Raceway Dia (mm)	500	750	1000	1250	1500	2000	2500	3000
Min Support Thickness (mm)	25	30	35	40	50	60	70	80

The width of the supporting surface must be at least equal to the width of the ring it supports

Permissible flatness deviation and deflections in supporting structure

In order to make the slewing bearing turn smoothly, the mounting structure should be stress-relived after welding procedure, The maximum permissible out-of-flatness, including slops and axial deflections is detailed in the respective tables. See table 1

Regarding the slope of the machined surfaces, the figures shown in the table refer to a support width of 100mm. another important factor is to ensure that the maximum value is reached only once per 180 °sector.

As in the case of out-of-flatness, any deflections in the supporting structure must not allowed to lead to localized buckling which might cause tight spots in the raceways. This could easily lead to over-loads. For this reason, the same conditions as for the out-of-flatness will apply.

For the maximum permissible deflections in the Table 2, the permissible slope may be twice the value"P" in Table 1 (Reference width 100mm)

The maximum permissible axial deflections "V" shown in Table 2 apply to all bearings types and are indicated as a function of the track diameter of the bearing

Table 1:

Permissible out –of-flatness including slope "p" of the machined support surface

Track diameter	Out of flatness including slope per support surface "P" in mm		
DL(mm)	Single-row ball four point contact ball bearings	Double-row ball Eight point contact ball bearings	Roller bearing Slewing bearings
To 1000	0.15	0.20	0.10
To 1500	0.19	0.25	0.12

To 2000	0.22	0.30	0.15
To 2500	0.25	0.35	0.17
To 4000	0.30	0.40	0.20
4000-6000	0.40	0.50	0.30
6000-8000	0.50	0.60	0.40

Table 2 :

Maximum permissible axial deflections for contact surfaces at maximum operating load

Track Dia (mm) (DL)	To 1000	To 1500	To 2000	To 2500	To 3000	To 3500	To 4000	To 5000	To 5500	To 6000
Max Axial deflections in mm (V)	0.6	0.8	1.0	1.3	1.6	2.0	2.5	3.0	3.6	4.2

Besides the inner and outer ring of a slewing bearing must rest fully on the supporting structure surface.

2.3 Mounting elements selection

Choose bolts of recommended grade, quality class 10.9(metric) or SAE grade 8 bolts, Grade 12.9 bolts are only used in very rare circumstances.

Do not use a fully treaded bolt.

Only use treated hardened flat washers.

Use of elastic washers is absolutely prohibited. Do not reuse bolts, nuts and washers.

3. Installation of Slewing Bearing

3.1 Hardness gap on slewing bearings

The hardness gap occurs in the process of raceway inductive hardening and is located between the end and the beginning of the hardening. These areas must be placed in the area of least load. Ideally at zero load when installing slewing bearing.

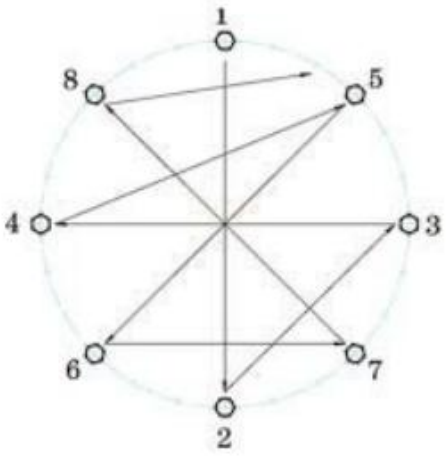
The position of the hardness gap on each of the slewing ring can be told as follows:

Slewing Bearing	Internal gear type	External gear type	Non Gear type
Inner ring	S marking	Filler plug	S marking or filler plug
Outer ring	Filler plug	S marking	S marking or filler plug

3.2 Fastening of slewing bearing

Before fastening, use a feeler gauge to check whether the surface of the slewing bearing is completely supported by the mounting structure. If this is not the case, the support surfaced of

the mounting structure must be reworked. Please follow the sequence pattern below to install bolts:



Tighten all fasteners lightly, and tighten to a specified value using a properly calibrated torque Wrench, hydraulic devices are advisable.

When tightening the whole bolt circle, ensure a uniform tightening torque.

The recommend bolt tightening torque values are listed in the table below:

Bolt Thread size	Bore Dia （mm） DIN/ISO 273	Tightening Torque at μ=0.14Nm	
		Bolt class 8.8	Bolt Class 10.9
M12	14	79	117
M14	16	126	184
M16	17.5	193	279
M18	20	270	387
M20	22	387	558
M24	26	666	954
M27	3330	990	1395
M30	33	1350	1890
UNC		Grade 5	Grade 8
UNC5/8”-11	18	180	260
UNC3/4”-10	21	320	460

UNC7/8”-9	25	520	730
UNC1”-8	27.5	770	1100
UNC1 1/8”-7	32	970	1560
UNC 1 1/4”-7	35	1370	2190
UNF		Grade 5	Grade 8
UNF5/8”-18	18	210	290
UNF3/4”-16	21	360	510
UNF7/8”-14	25	580	820
UNF1”-12	27.5	860	1210
UNF1 1/8”-12	32	1100	1760
UNF 1 1/4”-12	35	1520	2440

The slewing bearing should be rotated during tightening process as this will indicate the development of any tight spots, the cause of which must be investigated.

The bolt torque should be checked before machine is finally operated to check for any loss of pre-load due to the structure settling.

3.3 Pinion installation

The pinion should be located approximately at 90 ℃f the major loading axis. Adjust the driving pinion to maximum eccentric point of the gear ring, usually with green or red paint covering 2 or 3 teeth. The backlash of the slewing bearing gear and pinion must be within the limits of the calculated values or minimum at 0.05 x module. When several pinions are used, each one must be adjusted to the same conditions. During test, make sure good alignment of the pinion and of the slewing bearing axes permits a satisfactory contact cross all gear width. Before running, lubricate the slewing bearing gear and pinion gear.

3.4 Running test

After final tightening of all fasteners:

Rotate the ring for at least 3 turns. Recheck the backlash value on the gear mesh over one full revolution. Measure the total deflection under a know load. The checked point should be maked.It is advisable to register these values in a maintenance logbook specific to the machine.

Deflection measurement under load mounted slewing bearing

Operating process:

Place a measuring device between the two rings as close as possible to the raceway on the main load axis: precision grade 0.1mm minimum.

Calibrate to zero under a known load. Apply a measured load. Read the deflection value at the point considered. Repeat this measurement in the previously marked points. Take into account the deflection of the support structure and the fasteners elongation corresponding to the instrument position.

4. Greasing and Daily Maintenance

Maintenance involves regular lubrication of raceways and gear together with inspection of the fastening bolts and wear of the bearing.

4.1 Greasing and regressing

A suitable lubrication is essential for the longevity of the raceways and gears. Please fully grease the raceway with EP2 based grease or equivalent grease before installation .The greasing frequency varies according to utilization and working environment. We would recommend regressing every 60 hours for ball type slewing bearing, every 40 hours for roller type slewing bearing. The frequency should be reduced when conditions of application are several ,such as high temperature, high humidity, dust and large temperature difference environment.

Greasing is required before and after a long non-operation period.

Slowly rotate the bearing while greasing the raceway.

During cleaning prior to regreasing the gear, check carefully for any foreign body at the tooth root ring and pinion. Check the even load distribution of the pinion on the entire width of the ring gear and correct alignment of the axes if needed. Check the backlash of the pinion and ring gear.

4.2 Preventive maintenance

A visual examination makes it possible to ensure the integrity of the protective seals. After greasing, wipe clean residue of old grease and check for pollutions such as sand, cal, metallic particles, ect. it is particularly important to check that the required preload level of the bolts is still maintained as the fasteners of the slewing bearings are essentially working in fatigue. We recommend retightening the fasteners after the first two or four months of utilization and then proceeding to a systematic yearly check. if any bolt is found loose, a further in deep examination is essential. The necessary preservative measures must then be exercised.

When inspecting, the following method can be used (approximately valid for crane operation)

Inspection No.	Number of Operating Hours	Inspection Action

1	About 200 hours	✧ Inspect all bolts torque ✧ if more than 10% of the bolts are loose, another inspection is necessary after about 200 operating hours
2	About 600hours	Inspect all bolts torque
3	After 2000 hours	✧ If one or more bolts are loose to less than 80% of the prescribed torque, these and both adjoining bolts must be replaced by new ones. ✧ If 20% of the bolts have less than 80% prescribed torque, all bolts must be replaced by new ones
	Each 12000 hours	Replace all bolts by new ones

In addition to the fixing bolts check, raceway wear checking is also carried out in operation (mainly at significant important rotary connections) using the measurement method “titling clearance”. The tilting clearance is the difference of the mutual ring displacement in axial direction measured under load by minimum and maximum tilting moment.

4.3 Seals

Seal is usually specific to each manufacturer and the profiles and groove dimensions vary. Seals must be inspected at least annually and replaced as required. Standard nitrile seals will perish in approximately 5 years.

The installation and maintenance manual provide important instructions and must be precisely followed.

More detailed information will be provided by your request.

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