伟隆港机

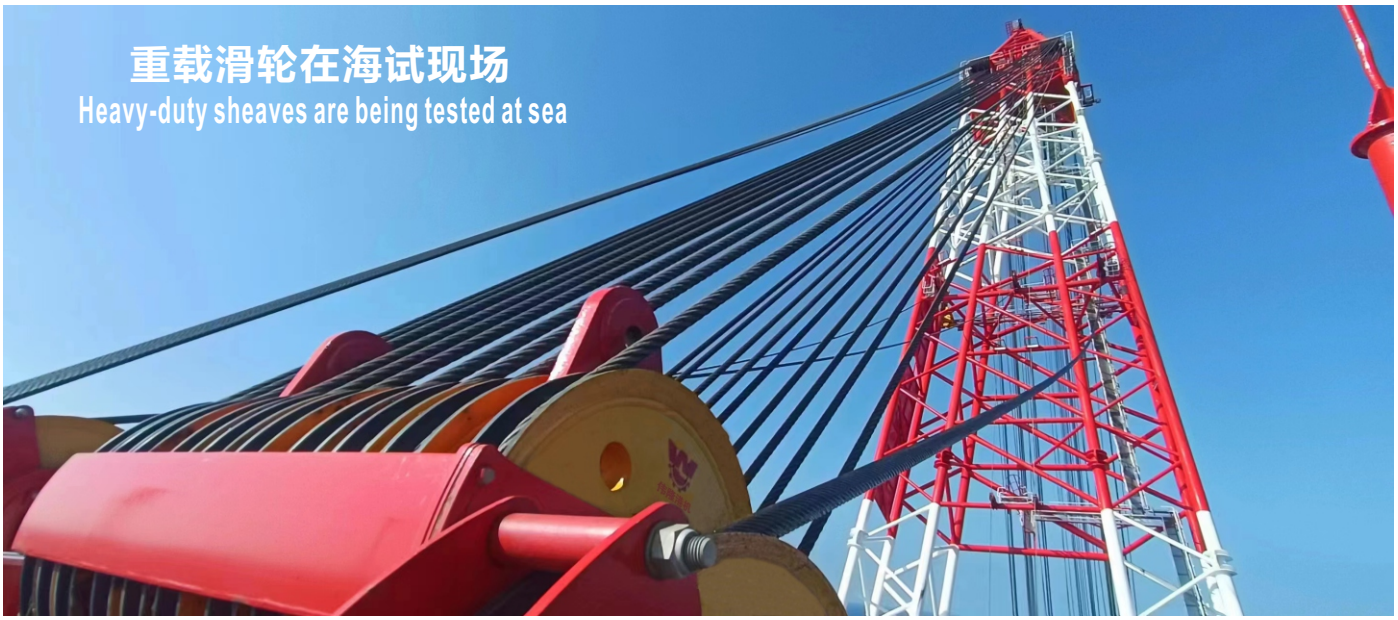
WQHL系列轻型重载焊接滑轮

SERIES WQHL LIGHT HEAVY-DUTY WELDING SHEAVE

2023年9月版（Sep .2023 Edition)

宁波伟隆港口机械有限公司

NINGBO WEILONG PORT MACHINERY CO., LTD.



重载滑轮在吊装作业中
Heavy-load sheave is under working

滑轮动载试验台在工厂作重载荷试验
The sheave dynamic load test bench is carrying out heavy load test

一、港机滑轮的痛点

1. 钢丝绳滑轮是港机传动链中的必用部件。早年的铸钢滑轮和近年的热轧滑轮均存在久用后产生绳槽压痕的弊端，此情况以桥吊为尤。一旦产生压痕，会越陷越深，严重损伤钢丝绳，减短钢丝绳的使用寿命。如图2。

图1 Fig. 1

I. Advantages of Series WQHL Welding Sheave

1.Steel rope sheave is a necessary part in the transmission chain of port machinery. Both the cast steel pulley in the early years and the hot rolled pulley in the recent years have the disadvantage of producing groove indentation after long service, especially for the bridge crane. Once the indentation is produced, it will become deeper and deeper, seriously damage the wire rope, and shorten the service life of the wire rope. See Figure 2.

图2 Fig. 2

2. 如何有效解决上述弊端，伟隆港机在近年来通过大量研究和实践，对绳槽采用冷轧成形工艺，焊接成型后，辅以热处理对绳槽硬化，能达到高致密度的硬化层，可抗得住桥吊起升时钢丝绳对滑轮绳槽的冲击。图4为使用5年后桥吊起升滑轮的视图。

图3 Fig. 3

2. How to effectively solve the above drawbacks, Weilong in recent years through a lot of research and practice, the rope groove using cold rolling forming process, welding forming, supplemented by heat treatment to harden the rope groove, can achieve a high density hardened layer, can withstand the impact of the rope on the pulley groove when the bridge lifting. Figure 4 shows the view of the bridge lifting sheave after 5 years of use.

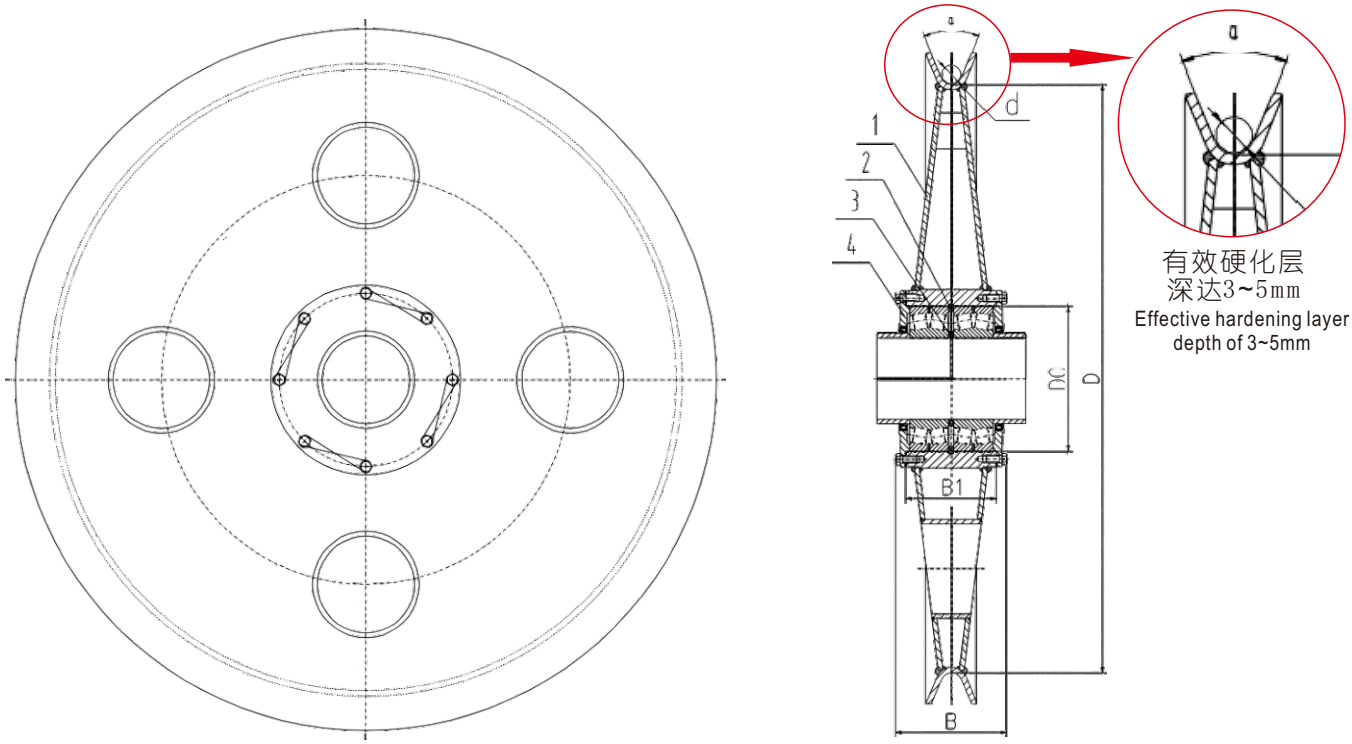
图4 Fig. 4

二、WQHL系列轻型重载焊接滑轮优势　II. Advantages of Series WQHL Welding Sheave

发明专利号 Invention code: ZL 2015 1 0145434.5

我公司生产的WQHL系列重载焊接滑轮，滑轮绳槽通过冷轧加工成形后，与支承幅板、轴承套，焊接而成。结构如图1 ，广泛用于集装箱岸桥、抓斗式卸船机、场桥轮胎吊、轨道吊、门机及大型海工起重机等各种起重设备，能适应频繁起动及重载冲击工况。
其性能优点如下：
◇重量轻，转动惯量小，约为传统精铸滑轮重量的1/2-3/4，适合频繁起动、制动、冲击重载工况。因转动惯量小，使钢丝绳与滑轮的相对滑移小，减少滑轮与钢丝绳之间的磨损，能有效提高钢丝绳的使用寿命。
◇冷轧绳槽：组织致密，抗磨损，抗压痕，绳槽硬度按不同工况作分级热处理硬化，绳槽表面硬度按要求可达HRC35-58，使用寿命长。
◇滑轮采用双腹板闭式小箱型结构，极大地提高承载和偏载能力，安全可靠。

Our WQHL series heavy-duty welded sheaves are cold-rolled and shaped, welded to the support plate and bearing sleeve. Structure as shown in Figure 1, widely used in QC, Ship unloader, RTG, RMG, and other lifting machinery, can adapt to frequent starting and impacting heavy-load working conditions.
It has advantages as follows:
◇Light weight, small rotating inertia, about 1/2-3/4 of the weight of the traditional cast sheave, suitable for frequent starting, braking, impacting heavy-load conditions. Because of the small rotating inertia, the relative slip between steel wire rope and sheave is small, which reduces the wear between sheave and steel wire rope and can effectively improve the service life of steel wire rope.
◇ Cold-rolled rope groove: dense organization, anti-wear, indentation resistance, rope groove hardness according to different working conditions for graded heat treatment hardening, rope groove surface hardness according to the requirements of HRC35-58, long service life.
◇ The sheave adopts double web closed box structure, which greatly improves the load-bearing and bias-load capacity and is safe and reliable.



1-焊接滑轮 Weld sheave; 2-外隔圈 Outer spacer 3-内隔圈 Inner spacer; 4-端盖 End cover

图1 焊接重载滑轮结构 Figure 1 Structure of welded heavy-load sheave

三、WQHL系列轻型重载焊接滑轮的应用

III. Advantages of Series WQHL Welding Sheave

1. 抓斗式卸船机上的应用

1. Application of grab type ship unloader

2. 桥吊上的应用

1. Application of QC

3. 海上风电安装船上的应用

3. Applications of offshore wind power installation vessels

四、滑轮型式结构

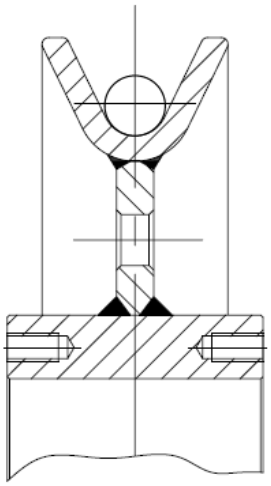
IV. Structure types of Sheave

1、按照滑轮腹板结构分类（图2）

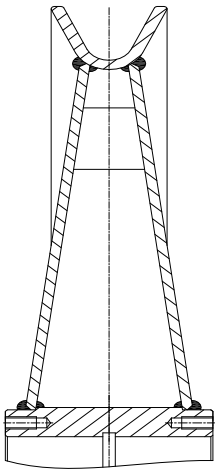
a）绳径D ≤950mm，单腹板结构
b）绳径D ＞ 950mm，双腹板结构

1、According to the different web structures (Figure 2)

a) Rope diameter D ≤ 950mm, single web structure
b) Rope diameter D > 950mm, double web structure



a）单腹板结构 Single web structure

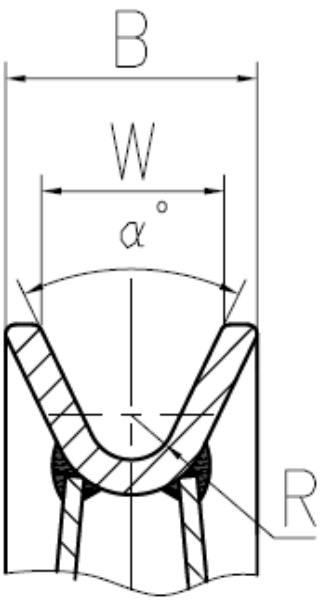


b）双腹板结构 Double web structure

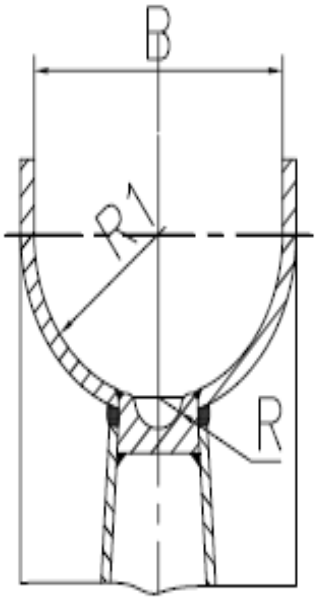
图2 滑轮腹板结构 Figure 2 Sheave web structure

2、按绳槽结构分类（图3）

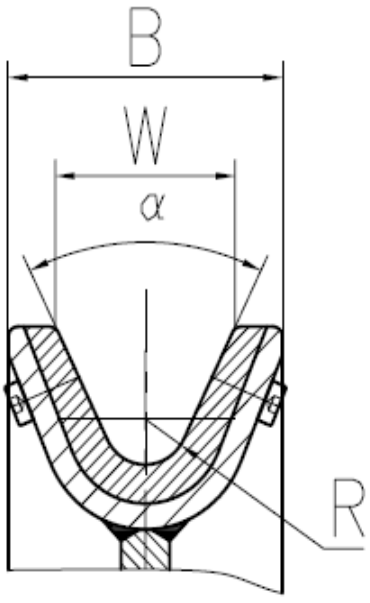
2、According to the rope groove structure (Figure 3)



a)标准绳槽 Standard groove



b）宽槽绳槽Wide groove K

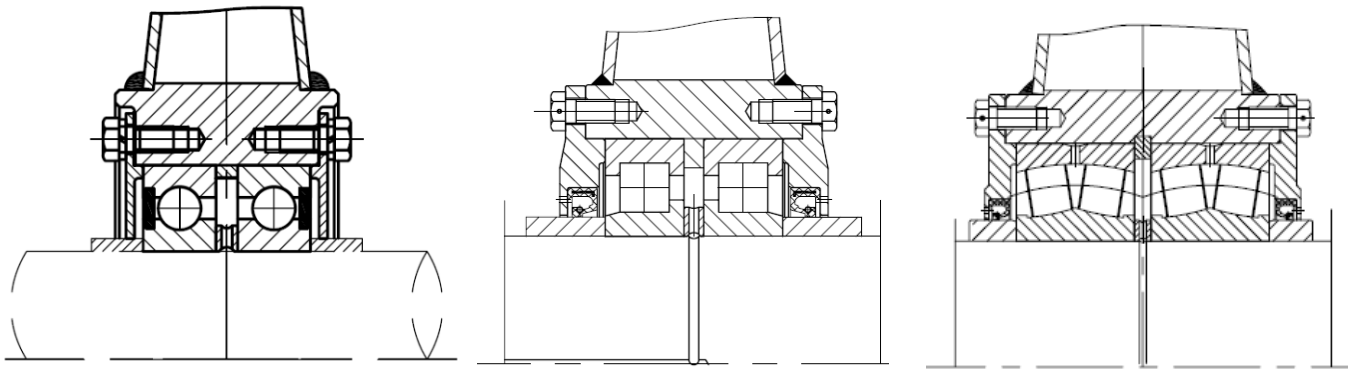


c）复合绳槽Composite groove F

图3 绳槽断面结构分类 Figure 3 Rope groove section structure classification

3、按滑轮轴承结构分类（图4）

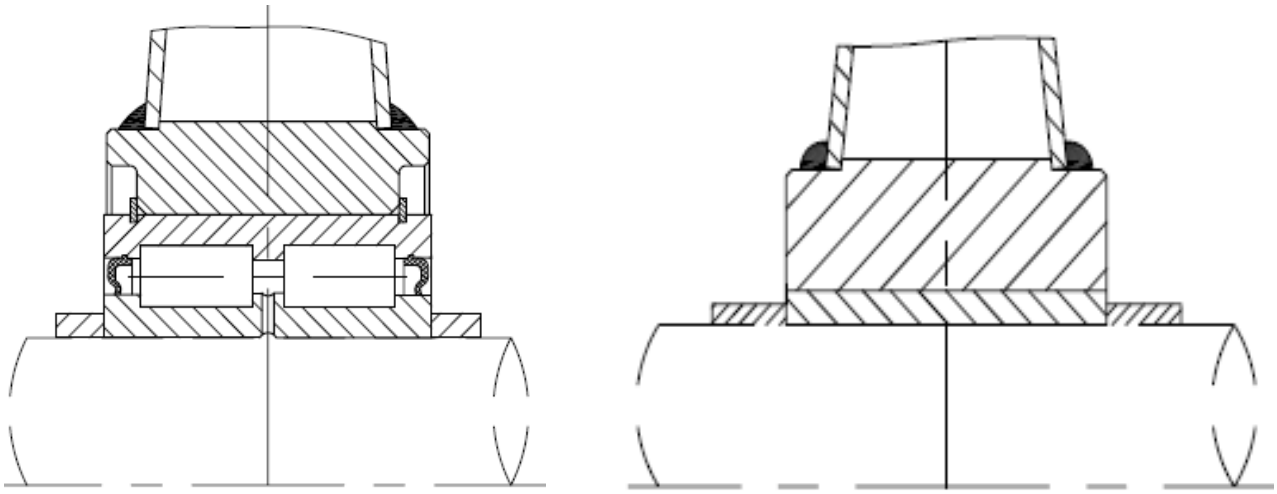
3、According to bearing structure (Figure 4)



a）深沟球轴承
Deep groove ball bearings

b）圆柱滚子轴承（标准端盖）
Cylindrical roller bearings(Standard)

c）双列调心滚子轴承
Double row spherical roller bearings



d）双列满装圆柱滚子轴承
Double row full complement cylindrical roller bearings

e）滑动轴承
Sliding bearings

图4 滑轮轴承结构形式 Figure 4 Bearing structure forms

注：我公司标准滑轮以b类圆柱滚子轴承（图4）来配置端盖，用户有其它配置要求请在订货时注明。

Note: Our standard sheaves adopt the Type b cylindrical roller bearings(See figure 4) end caps. If users have other configuration requirements, please specify when ordering.

4、按绳槽表面硬度分类：

根据载荷和不同工况的耐磨要求，绳槽用不同材料和热处理工艺得到不同的硬度。如下表所示，供用户按滑轮的不同工况选用。

4. According to the surface hardness of the rope groove:
According to the load requirements and the wear resistance requirements of different working conditions, the rope grooves are made of different materials and heat treatment processes to obtain different hardness. As shown in the table below, users can choose according to their needs.

表1 绳槽硬度表 Table 1 Rope groove hardness table

绳槽硬度类型 Hardness type	高硬 High hardness	中硬 Medium hardness	低硬 Low hardness	无硬层 No hardness
硬度 Hardness	HRC50-58	HRC40-48	HRC30-38	表面硬度≤HB240 Surface hardness
使用场合 Application	适用于起重机工作级别≥M6以上工作机构，且有频繁冲击载荷工况。It is suitable for the working mechanism of crane working level ≥ M6, with frequent impact load condition.	适用于起重机工作级别≥M3-＜M6的工作机构，伴有中等冲击载荷。It is suitable for the working mechanism of crane working level ≥ M3 but ＜ M6, with medium impact load	适用于起重机工作级别≥M1-＜M3的工作机构，有较小的冲击载荷工况。It is suitable for the working mechanism of the crane working level ≥ M1 but ＜ M3, with small impact load condition.	适用于非起重机构滑轮。It is suitable for non-hoisting mechanism.

1. 起重机构用滑轮的绳槽硬度的出厂标准：

1)．对D≤950滑轮的绳槽硬度标准为HRC50-58，绳槽表面淬硬层深度≥3mm；

2)．对D＞950重载滑轮的绳槽硬度标准为HRC50-58，绳槽表面淬硬层深度≥5mm；

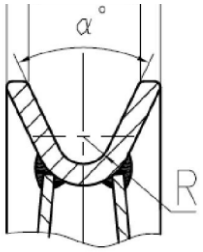
2. 用户订货时如无特殊说明，皆按此标准供货。

1.The factory standard for rope groove hardness of sheaves for hoisting mechanisms:
a. The standard of hardness of rope groove for D≤950 sheave is HRC50-58, and the depth of hardened layer on the surface of rope groove is ≥3mm.
b. The standard of hardness of rope groove for D＞950 heavy-duty sheave is HRC50-58, and the depth of hardened layer on the surface of rope groove is ≥5mm.
2. If there are no special instructions when ordering, all products are supplied according to this standard.

5、绳槽断面角度分类：

5. According to rope groove section angle:

表2 绳槽断面角度 Table 2 Rope groove section angle



绳槽角度Angle α	45 °	35 °	52 °
主要使用地区 Main Area	中国大陆 Mainland	美国地区 US Region	欧洲地区 European

WQHL轻型重载焊接滑轮绳槽断面角度 α 的误差符合GB/T 27546-2011。
我公司出品的标准绳槽断面角度为45°，用户如有特殊需要，可在订货时说明。

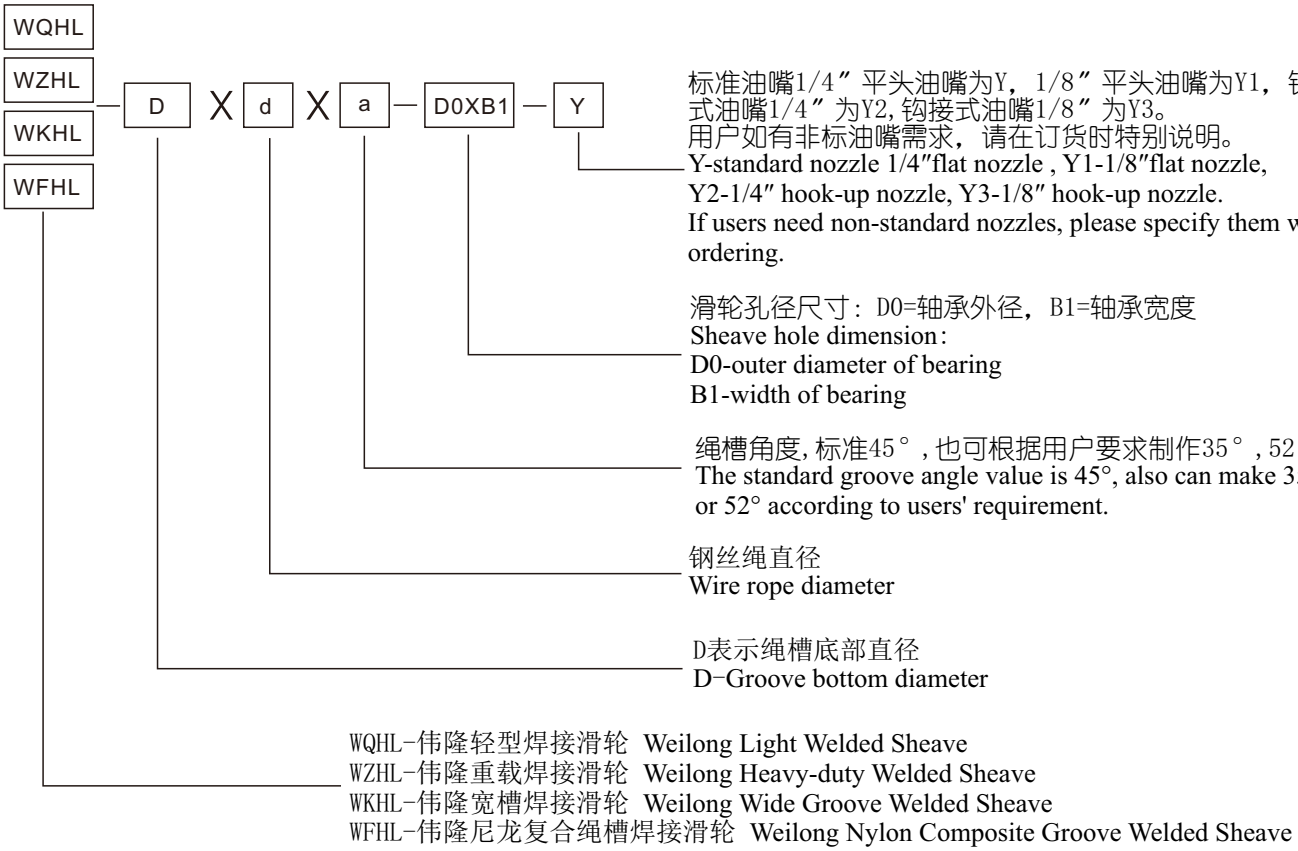
The error of WQHL welded sheave rope groove section angle α should meet the requirements of GB/T 27546-2011.
The standard rope groove section angle is 45°. If users have special needs, please specify when ordering.

五、滑轮订货型号标记示例

1、用户可根据配套钢丝绳直径d、滑轮底径D、轴承型号、规格、尺寸（关联滑轮样本中D0和B1尺寸）、端盖固定形式，以及润滑要求等条件订货。

2、本厂可根据用户需求设计、制造滑轮或滑轮组。

3、标记示例：



示例：预订购宁波伟隆轻型焊接滑轮，滑轮绳槽底径D=1000，适用钢丝绳直径d=32，绳槽断面角度a=45°，滑轮内孔直径D0=290，滑轮轮毂宽度B1=118，标准油嘴1/4″平头油嘴，则标记为：

WQHL1000×32×45°-290×118-Y

4、WQHL系列滑轮规格表：

WQHL系列滑轮绳槽底径D与钢丝绳直径d的选用系列符合GB/T27546-2011和GB/T9005.1-1999要求，我公司可生产绳槽底径D≤Φ2500mm各类滑轮，适用于直径Φ6-72mm的各种钢丝绳，可完全替代现行桥吊、卸船机、场桥起重机械上的各类精铸和热轧滑轮，各种滑轮的技术参数见下表3、4、5。

V. Order type of Series WQHL Welding Sheave

1、Users can order according to the matching wire rope diameter d, pulley bottom diameter D, bearing model, specification, size (D0 and B1 dimensions in this sample), end cover fixing form, and lubrication requirements.

2、We can design and manufacture sheaves or sheave sets according to the needs of users.

3、Example of order type:

Example: If user want to order Ningbo Weilong welded sheave, the bottom diameter of the rope groove of the sheave D=1000, the wire rope diameter d=32, the angle of the rope groove section a=45°, the diameter of the inner hole of the sheave D0=290, the width of the hub of the sheave B1=118, the standard oil nozzle 1/4″ flat nozzle, then the mark should be:

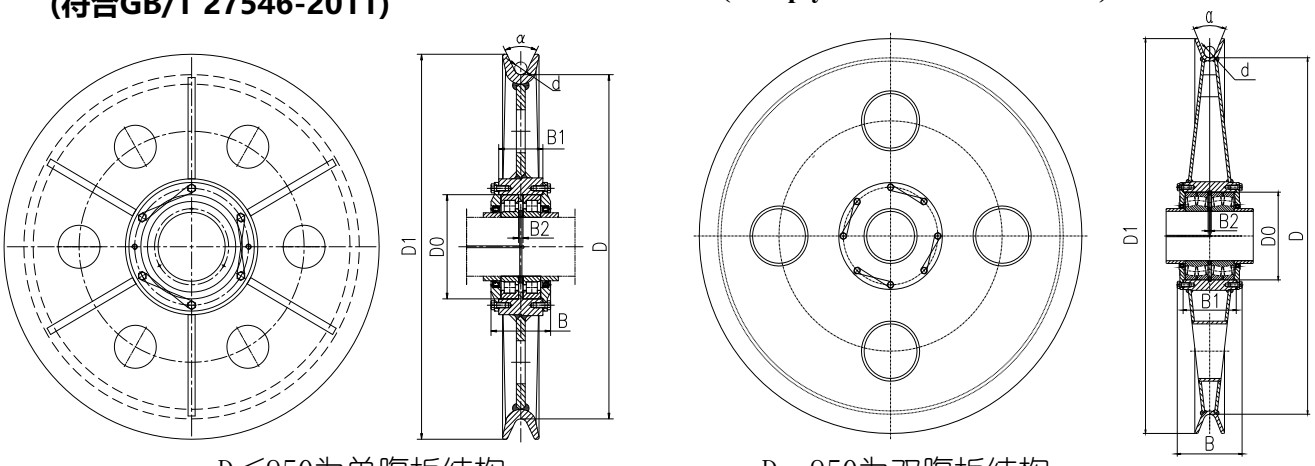
WQHL1000×32×45°-290×118-Y

4. WQHL Series Specification Sheet

WQHL series sheave rope groove bottom diameter D and wire rope diameter d meet the requirements of GB/T27546-2011 and GB/T9005.1-1999. Our company can produce all kinds of sheaves with rope groove bottom diameter D≤Φ2500mm, suitable for all kinds of wire ropes with diameter Φ6-72mm. It can completely replace various types of precision casting and hot-rolled sheaves on current QC, ship unloaders, and other hoisting machinery. The technical parameters of various sheaves are shown in Tables 3, 4, and 5 below.

4.1 WQHL系列轻型焊接滑轮
WZHL系列重载焊接滑轮
(符合GB/T 27546-2011)

4.1 WQHL series light welded sheave
WZHL series heavy-duty welded sheave
(Comply with GB/T 27546-2011)



D≤950为单腹板结构
D≤950 is single web structure

D＞950为双腹板结构
D＞950 is double web structure

图5 标准绳槽滑轮 Figure 5 Standard rope groove sheave

表3 WQHL、WZHL系列标准绳槽滑轮规格表
Table 3 Standard rope groove sheave specification table for WQHL and WZHL series sheaves

滑轮型号 Sheave type	D 滑轮绳槽底径 Groove diameter (mm)	D1 滑轮最大外径 Maximum Outer diameter(mm)	a 绳槽断面角度 Groove angler (°)	d 适用钢丝绳直径 Wire rope diameter	D0 滑轮孔径直径 Hole Diameter (mm)	B 滑轮外型最大宽度 Maximum Outer width	B1 滑轮轮毂宽度 Wheels Width (mm)	B2 内外隔圈宽度 Spacer Width (mm)	参考重量 Weight (Kg)	推荐轴承型号 (仅供参考) Recommended Bearings Model (For reference only)
WQHL400	400	445	45°	12 14 16	120 125	93 96	64 67	8	39	NJ213E NJ2214E
WQHL440	440	525	45°	24 26 28	160 230	113 135	78 100	8 10	49	NJ218E NJ226
WQHL500	500	550	45°	12 14 16	125	111	82	8	41	NJ2214E
WQHL560	560	620	45°	14 16 18	125 160 180	111 113 124	82 78 89	8 8 10	45	NJ2214E NJ218E NJ220E
WQHL600	600	650	45°	14 16 18	125	111	82	8	48	NJ2214E
WQHL630	630	700	45°	14 16 18	180	124	89	10	58	NJ220E
WQHL650	650	720	45°	24 26 28	125 200	111 134	82 99	8 12	68	NJ2214E NJ222E
WQHL700	700	775	45°	28 30 32	200 290	134 148	99 118	12 10	73	NJ222E NJ232E
WQHL710	710	800	45°	24 26 28	180 200 230 320	124 134 135 161	89 99 100 126	10 12 10 10	81	NJ220E NJ222E NJ226 NJ236E
WQHL750	750	840	45°	24 26 28	200 230	134 135	99 100	12 10	78	NJ222E NJ226

滑轮型号 Sheave type	D 滑轮绳槽底径 Groove diameter	D1 滑轮最大外径 Maximum Outer diameter(mm	a 绳槽断面角度 Groove angle (°)	d 适用钢丝绳直径 Wire rope diamete	D0 滑轮孔径直径 Hole Diameter	B 滑轮外型最大宽度 Maximum Outer width (mm)	B1 滑轮轮毂宽度 Wheels Width (mm)	B2 内外隔圈宽度 Spacer Width	参考重量 Weight (Kg)	推荐轴承型号 (仅供参考) Recommended Bearings Model (For reference only)
WQHL760	760	850	45°	28 30 32	230	135	100	10	82	NJ226
WQHL800	800	925	45°	34 36 38	230 270 290 320	135 145 148 161	100 110 118 126	10	96	NJ226 NJ230 NJ232E NJ236E
WQHL850	850	940	45°	28 30 32	290 320	148 161	118 126	10	101	NJ232E NJ236E
WQHL900	900	990	45°	34 36 38	250 270 290 320	141 145 148 161	106 110 118 126	10	105	NJ228 NJ230 NJ232E NJ236E
WQHL950	950	1050	45°	34 36 38	270 290 310 320	145 148 158 161	110 118 122 126	10 10 12 10	136	NJ228 NJ232 NJ234 NJ236E
WQHL1000	1000	1120	45°	34 36 38	225 290 320	203 148 161	158 118 126	10	141	SKF23128 NJ232E NJ236E
WQHL1100	1100	1220	45°	36 38	320	161	126	10	204	NJ236E
WQHL1200	1200	1330	45°	36 38 40	320 360	244 268	200 224	12	225	NJ236E 22240
WQHL1300	1300	1440	45°	42 44 48	320	244	200	12	413	22236CC/ W33
WQHL1400	1400	1545	45°	42 44 48	320 360 400	244 268 208	200 224 158	12 12 14	335	22236CC/W33 22240 NJ244
WQHL1600	1600	1750	45°	52 54	360 400	268 208	224 158	12 14	596	22240 NJ244
WQHL1800	1800	1970	45°	52 54	440	228	178	14	615	NJ248
WQHL2100	2100	2270	45°	52 54	500	410	360	14	710	23160
WZHL1200	1200	1360	45°	56	420	180	149	-	498	SL04-5056NR
WZHL1250	1250	1400	45°	62	420	180	149	-	580	SL04-5056NR
WZHL1350	1350	1550	45°	66	540	194	194	-	825	SL04-5072NR
WZHL1450	1450	1682	45°	72	540	194	194	-	992	SL04-5072NR
WZHL1850	1850	2046	45°	70	460	213	171	-	1309	SL04-5060NR

注：用户如有不同需求的滑轮，请提供订货图纸，我公司也承接制造。

Note: If users have different needs of sheaves, we can also manufacture according to the order drawings.

4.2 WKHL系列宽槽焊接滑轮：

一般用于卸船机过梨形头之用。其与同规格的铸造滑轮相比，重量减轻1/2-1/3，减少了转动惯量，增长了钢丝绳使用寿命。

4.2 WKHL series wide groove welded sheave:

Generally for the using of ship unloader. The weight is 1/2-1/3 lighter than the cast sheave of the same specification, which reduces the moment of inertia and increases the life of the wire rope.

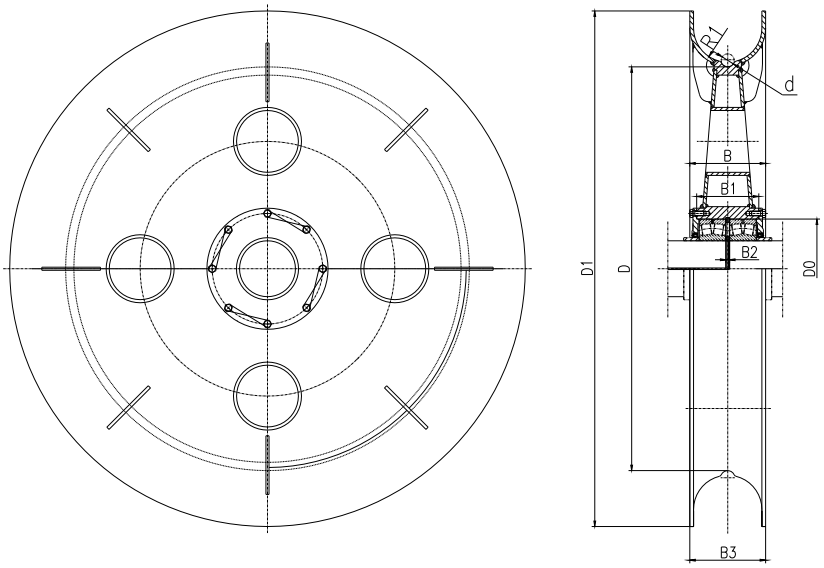


图6 宽槽焊接滑轮 Fig. 6 Wide groove welded sheave

表4 WKHL系列宽槽焊接滑轮规格表

Table 4 Specifications of WKHL series wide groove sheave

滑轮型号 Sheave type	D 滑轮绳槽底径 Groove diameter	D1 滑轮最大外径 Maximum Outer diameter(mm)	d 适用钢丝绳直径 Wire rope diameter	D0 滑轮孔径直径 Hole Diameter	B 滑轮外型最大宽度 Maximum Outer width	B1 滑轮轮毂宽度 Wheel Width (mm)	B2 内外隔圈宽度 Spacer width	B3 滑轮宽槽外宽 Groove Width (mm)	R1 滑轮宽槽半径 Groove radius	参考重量 Weight (Kg)	推荐轴承型号 (仅供参考) Recommended Bearings Model (For reference
WKHL 1000	1000	1360	34 36 38	225 290 320	203 150 161	158 115 126	10	234	105	236	SKF23128 NJ232E NJ236E
WKHL 1200	1200	1560	36 38 40	320 360	244 268	200 224	12	244	110	585	22236CC/W33 22240
WKHL 1300	1300	1660	42 44 48	320	244	200	12	244	110	600	22236CC/W33
WKHL 1400	1400	1710	42 44 48	320 360 400	244 268 208	200 224 158	12 12 14	244	110	565	22240 NJ244
WKHL 1600	1600	1960	52 54	360 400	268 208	224 158	244	12 14	110	724	22240 NJ244
WKHL 1800	1800	2240	52 54	440	228	178	294	14	135	915	NJ248
WKHL 2100	2100	2540	52 54	500	410	360	294	14	135	1310	23160

六、WFHL系列尼龙复合绳槽焊接滑轮简介

VI. Introduction of WFHL series nylon composite rope groove welding sheave

专利号 Utility model patent: ZL 2022 2 2853188.7

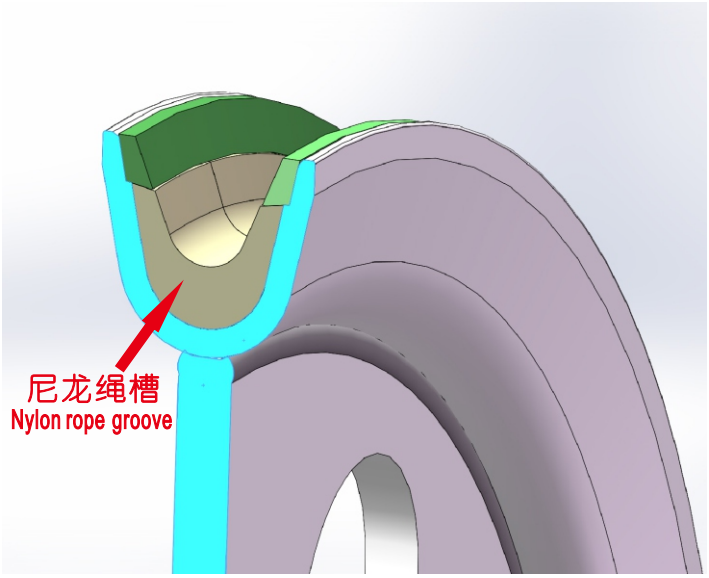


图1 Fig. 1

1、优势介绍

尼龙复合绳槽焊接滑轮，简称尼龙复合滑轮，结构如图1。

A、尼龙复合滑轮，顾名思义，其绳槽由尼龙制成，在钢制焊接滑轮槽中镶嵌了尼龙绳槽，由尼龙来承载钢丝绳的运动，使钢丝绳无运动磨耗。经测定延长了钢丝绳的使用寿命近1/3强。

B、尼龙绳槽耐用度高，经实用证明使用寿命为5 ~8年（折合作业100 ~160万箱次），且磨损后可在不拆卸滑轮情况下现场作装配式更换，省时省力。

C、整体滑轮重量轻，重量为铸造滑轮的2/3，热轧焊接滑轮的4/5，使传动惯量小。

I. Advantages introduction:

Nylon composite rope groove welding sheave, referred to as nylon composite sheave, the structure is shown in Figure 1.

A. Nylon composite sheave, as the name suggests, its rope groove is made of nylon, in the steel welded sheave groove inlaid with nylon rope groove, by nylon to carry the movement of the wire rope, so that the wire rope without movement wear. After measuring, the service life of the wire rope is extended by nearly 1/3.

B. Nylon rope groove durability is high, practical proved that the service life is 5 ~ 8 years (equivalent to 1 ~ 1.6 million TEU of operation), and after wear can be replaced in the field without disassembling the sheave, saving time and effort.

C. The overall sheave weight is light, the weight is 2/3 of the casting sheave, and 4/5 of the hot rolled welding sheave, so that the transmission inertia is small.

2. WFHL系列尼龙复合绳槽焊接滑轮的应用

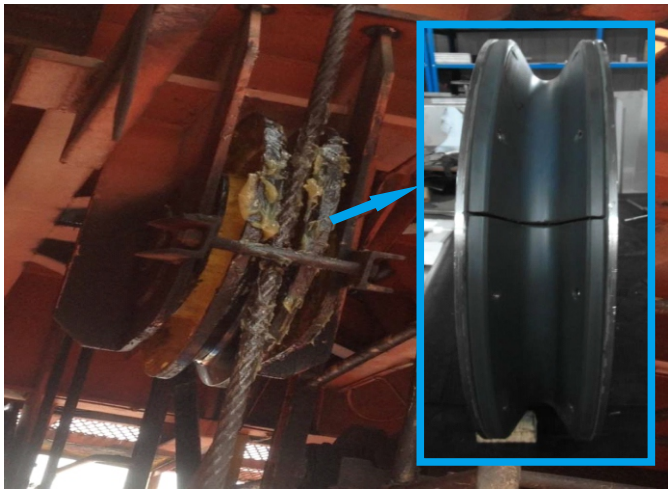
宁波北三集司RTG起升尼龙复合滑轮
NICT RTG lifting nylon sheave

盐田RTG起升尼龙复合滑轮
YICT RTG lifting nylon sheave

天津集装箱码头RTG起升尼龙复合滑轮
TICT RTG lifting nylon sheave

II. Advantages of WFHL series nylon composite rope groove welding sheave

青岛QQCTU RMG起升尼龙复合滑轮
QQCTU RMG lifting nylon sheave

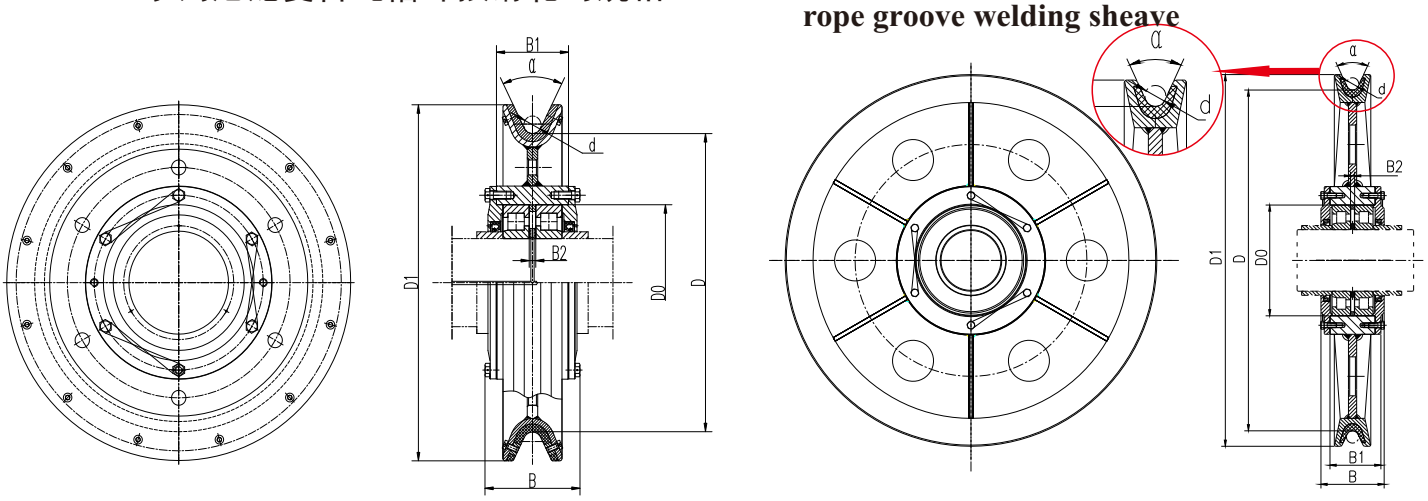


盐田小车架防磨尼龙复合滑轮
YICT trolley frame anti-wear nylon sheave

尼龙绳槽的磨损测量
Wear measurement of nylon rope groove

3. WFHL系列尼龙复合绳槽焊接滑轮的规格

II. Scales of WFHL series nylon composite rope groove welding sheave



WFHL420-480

RTG小车架转向用

For RTG trolley frame steering

WFHL760-810

RTG起升用

For RTG lifting

图7 复合绳槽焊接滑轮 Fig. 7 Composite rope groove welded sheave

表5 WFHL系列复合绳槽焊接滑轮规格表

Table 5 Specifications of WFHL series composite rope groove welded sheave

滑轮型号 Sheave type	D 滑轮绳槽底径 Groove diameter (mm)	D1 滑轮最大外径 Maximum Outer diameter (mm)	a 绳槽断面角度 Groove angle (°)	d 适用钢丝绳直径 Wire rope diameter (mm)	D0 滑轮孔径直径 Inner Diameter (mm)	B 滑轮外型最大宽度 Maximum Outer width (mm)	B1 滑轮轮毂宽度 Wheels Width (mm)	B2 内外隔圈宽度 Spacer Width (mm)	参考重量 Weight (Kg)	推荐轴承型号 (仅供参考) Recommended Bearings Model (For reference only)
WFHL 420	420	470	45°	12 14 16	120 125	93 96	64 67	8	44	NJ213E NJ2214E
WFHL 440	440	525	52°	24 26 28	160 230	113 135	78 100	8 10	50	NJ218E NJ226
WFHL 480	480	570	52°	24 26 28	230	135	100	10	55	NJ226
WFHL 760	760	850	45°	28 30 32	230	135	100	10	82	NJ226
WFHL 810	810	920	45°	34 36 38	230 270 290 320	135 145 148 161	100 110 118 126	10	97	NJ226 NJ230 NJ232E NJ236E

注：我公司承接各种非标滑轮的设计与制造。

Note: Our company undertakes the design and manufacture of various non-standard sheaves.

我们的产品走向世界！

Our Products are used worldwidely !

WZHL重载焊接滑轮大量应用于海工作业，深受用户青睐。
WZHL Heavy-duty welded sheaves are widely used in marine operations and are favored by customers.

宁波伟隆港口机械有限公司

NINGBO WEILONG PORT MACHINERY CO., LTD.

地址：中国宁波市东钱湖镇创新工业区
四香路1号
电话：(86)574-88372266
传真：(86)574-88372264
邮编：315121
公司网站：http://www.weilongme.com.cn
电子信箱：weilong@weilongme.com.cn
服务热线:(86)574-88373131

Addr: No.1 Sixiang road, Innovation Industry Zone, Dongqianhu, Ningbo, China
Tel: (86)574-88372266
Fax: (86)574-88372264
P.C.: 315121
Web-site: http://www.weilongme.com.cn
E-mail: weilong@weilongme.com.cn
Serve-online: (86)574-88373131