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# SHA/SHH系列渣浆泵 安装、操作及维护手册

SHA/SHH Series Slurry Pump  
Manual Book for Installation, Operation and Maintenance

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本使用说明书包括基本介绍及注意事项。在泵的安装、电路连接及泵运行之前，请仔细阅读本说明书。当涉及到各机组零件时，请务必参照所有其它使用说明书及资料。

## 0、概述 Description

SHA/SHH系列渣浆泵是三联泵业集团在四十余年泵类产品开发制造经验及雄厚的杂质泵技术实力基础上，全面分析并依据渣浆泵在不同的工业领域现场运行的实际不同要求，采用最先进的设计理论，所研制开发的具有国际先进水平的渣浆泵。编写本使用说明书的目的是为了便于熟悉泵以及它们的特定用法。

本说明书含有关于泵可靠、安全及其有效运行的重要介绍，请务必按照使用说明书所要求的去做，这对于确保泵的可靠、寿命及安全来说极其重要。

本使用说明书并没有考虑到当地的规定，操作人员、包括那些被请来安装的人员，都必须严格遵守这些规定。

泵运行时，所输送的介质、流量、流速、密度、压力、温度和电机转速一定不能超过技术文件中所规定的极限值，以确保泵的运行能符合本说明书及合同文件中的规定。

铭牌上已标明了泵型号/规格、运行数据/系列编号，有疑问或重复订购，特别是在订购备件时，请参照这些数据。如果您需要本手册以外的其它介绍或说明，或者泵万一发生故障时，请与高瑞夫泵业售后服务部门联系。

### 0.0 安全

本使用说明书含有基本介绍、在装配、运转、维修时，必须参照它们。在安装和运转之前，安装人员和专门的负责人和操作人员都必须阅读和理解本使用说明书。

不仅要遵守“安全”这一节中的安全细则，而且安全指示要画在特定的标题下面。

#### 0.1 安全指示的标志

如果不遵守本手册中的安全细则，可能对人员造成危害，所以用危险符号将其特殊标出。



符号为：  
Symbol:

用来引起注意，如果不遵守安全细则，就会导致机器发生故障、功能不全。

还有一些指示直接标在机器上，例如：

- 表示运转方向的箭头；
- 表示管路连接的标志。

这些指示必须执行，并且必须一直标在醒目的地方。

The manual includes a basic introduction and some notices.Prior to the pump installation,electrical connection and pump operation,please read carefully this manual.

SHA/SHH slurry pump is developed based on years of pump manufacturing and abundant trash pump technology,fully analyzing its different field operation requirements for different industrial applications,introducing the most advanced design theory and collecting the trade talents at home and abroad.The manual is edited to facilitate our users to have a good understanding of the pump and its specific usage.

The manual includes an important introduction to the reliable,safe and effective operation.Please take care to do as requested in the use of manual,which is essential to the pump reliability,its longevity and safety.

The manual does not take into consideration of the local rules.The operators,including those invited installation personnel must strictly abide by these rules.

While the pump is being operated,the transmitted medium,capacity,flow,density,pressure, temperature and motor speed can not exceed the stipulated limit values in the technical documents to make sure that the pump operation shall be in conformity with the stipulations stated in the manual and contract document.

The pump model/specification,operating data/series No.are marked on the nameplate,and if you have any questions or there are any repeated orders,especially the order of the spare parts,these data shall be referred to.If you are in need of some other introductions or instruction manuals besides this manual,or if there are any failures,please contact our sales person or call on our customer service hot-line directly(our service hot-line:0086-15261527552)

#### 0.0 Safety

The manual includes a basic introduction.While there is assembly,operation and maintenance,these must be referred to.Before the installation and operation,the installation personnel,chiefs and operators must read and have a good understanding of the use manual.

Not only the safety rules stated in this chapter must be abided by,these safety indicators must be marked under the specific titles.

#### 0.1 Safety indicator

In case that the safety rules stated in the manual are not abided by,there may be some damages done to the personnel.So these danger codes must be marked out remarkably.



触电危险警告符号为：  
The warning symbol for the electric shock:

The word is applied to draw attention.If the safety regulations are not abided by,it shall bring failure and insufficiency of the machine.

Some other indicators are marked on the machine directly,for example:

- the arrow indicating the running direction
- the symbol for the pipe connection

These indicators must be abided by and marked at a conspicuous location.



词：  
Word:

### 0.2 人员限定及培训

泵在运行、维修、检查和装配时，所有参与这些工作的人员都必须够资格做这些工作。操作人员必须明确负责人、主管人和监督人。如果操作人员还不具备必要的处理问题能力，就必须进行适当的培训和指导。若有必要，可委托本公司来负责操作人员的培训。另外，操作人员还负责确保各负责人完全理解使用说明书的内容。

### 0.3 不遵守安全细则

不遵守安全细则会对人的安全、环境和机器本身造成危害，同时也会受到罚款以及赔偿损失。应该特别注意，如果不遵守安全细则，可能会导致：

- 重要的机器或机组功能丧失；
- 规定的维修和维护工作中断；
- 电、机械以及化学的影响会对人员造成危害；
- 有害物质的泄漏会对环境造成危害。

### 0.4 安全意识

一定要遵守本手册中的安全细则、有关国家制定的健康和安安全细则，以及对操作人员所指定的工作、运行和安全细则。

### 0.5 对操作人员/用户的安全细则

任何能造成危害的热冷元件必须由操作人员安装防护装置。机器运行时，为了防止与运动零件（例如联轴器）直接接触，一定不要将防护装置拆下。为了避免对人和环境造成危害，所输送的有害介质（例如易爆炸的、有毒的、热的介质）的泄漏（如轴封处的泄漏）必须妥善处理，并且必须遵守有关法定的规定。

关的危害性必须排除，这里是指适合于不同国家和当地能源公司的有关安全细则。

### 0.6 对维护、检查和安装工作的安全细则

必须确保所有的维护、检查和安装工作要由指定的、合格的并且对本说明书相当熟悉的专业人员执行。这些工作必须在停机时进行，并且必须遵守本手册中的停机规章制度。

当输送对健康有害的介质时，泵和泵机组必须消毒。

紧接着完成以下的工作：所有相关的安全保护装置必须重新安装、重新启动。机器重新运行之前请查阅“运行”一节中的说明。

### 0.7 不允许的备件制造和更换

与本公司商量之后，零部件才被允许更换。三联公司提供的原备件和附件是安全的。因使用其它零件而造成的损失，本公司概不负责。

### 0.8 不允许的工况

如果泵机组按照指定的用法使用，并且严格按照本使用说明书的要求进行操作，那么就能保证泵可靠安全地运行。在任何情况下，一定不要超过数据表里的极限值。

### 0.2 Qualified person & training

While the pump is being operated, maintained and assembled, all the participating working staff must be qualified to do the job.The chief,director and supervisor must be specified among operators.In case the operators are not competent in solving problems,appropriate training and guidance must be carried out.If needed,our company can be entrusted to take charge of the operators'training.Besides,the operators shall take responsibility to make every chief fully understand the contents stated in the manual.

### 0.3 Safety non-conformance rules

The safety non-conformance rules not only do harm to a person's safety,environment and machine itself,but also fines shall be brought out as a result and then compensation shall be paid.Please take great notice that:if the safety non-conformance rules are not abided by,the following results shall be brought about:

- An important machine or pump set fails;
- The repair and maintenance specified are interrupted;
- The electrical,mechanical and chemical effect shall do harm to a person;
- The leakage of hazardous substance shall be harmful to the environment.

### 0.4 Safety consciousness

The safety rules,some health and safety rules stipulated by our country,and some working,operation and safety rules stipulated by the operators must be abided by strictly.

### 0.5 Safety rules for the operator/customer

The protective device must be installed by operators for all the heating and cooling components that bring harm.While the pump is being operated,the protective device is not allowed to be removed to avoid from being in contact with the moving parts(eg,the coupling).To prevent harm from being done to the human and environment,the leakage(eg,the leakage of shaft seal)of all hazardous medium(eg,hazardous,toxic,or hot medium)dealt with shall be treated with great care,and some relevant statutory stipulations must be abided by.

The hazard of electricity must be eliminated,which hereby refers to the relevant safety rules appropriate to different national and local energy companies.

### 0.6 Safety rules over maintenance,check-up & installation

It must be guaranteed that all the maintenance,check-up and installation work must be carried out by these designated and qualified professionals who are fairly familiar with the manual.The work must be done during the shutdown period and these shutdown rules and regulations in the manual must be observed.

When it comes to transmitting hazardous substance,the pump and the pump set must be sterilized.

The following work shall be down by next step: all the relevant safety protective devices must be re-installed and re-started-up.Before the pump is being re-put into operation,the illustration in the chapter of "peration" must be referred to.

### 0.7 Unallowed manufacture & replacement of spare parts

After consulting with our company , the parts can be allowed to be replaced.The original spare parts and accessories provided by our Sanlian are secure.Some other losses caused by applying others'parts shall not be covered by our company.

### 0.8 Unallowed working conditions

If the pump set is being used in accordance with the stipulated usage and operated as requested by the use manual,the pump can be assured of its safe and reliable operation.Under any circumstance,the limit value marked in the data sheet can not be exceeded.



## 1. 运输 Transportation

### 1.1 安全细则



机组的运输需要适当的准备和处理。请参照以下的说明和安全细则。

### 1.2 运输

在任何情况下，运输时建议采用水平旋转，因为这样可以确保无论以什么方式运输，例如：公路运输、铁路运输或航运等等，机组都可以旋转安稳而无任何危险。

运输时，机组应当牢固地放在托运器货架上，所有容易松动的、可拆卸的零件都应当牢固固定。

### 1.3 用起重机吊泵机组



电机起吊孔仅用于起吊电机而不能起吊机组，用起重机起吊泵机组时，要注意拉力的方向，角度不要大于90°，两边分别使用起吊绳，正确的起吊方法如下图所示：

### 1.1 Safety rules

The transportation of the pump set shall have proper preparation and treatment.

Please refer to the following instruction and safety rules.

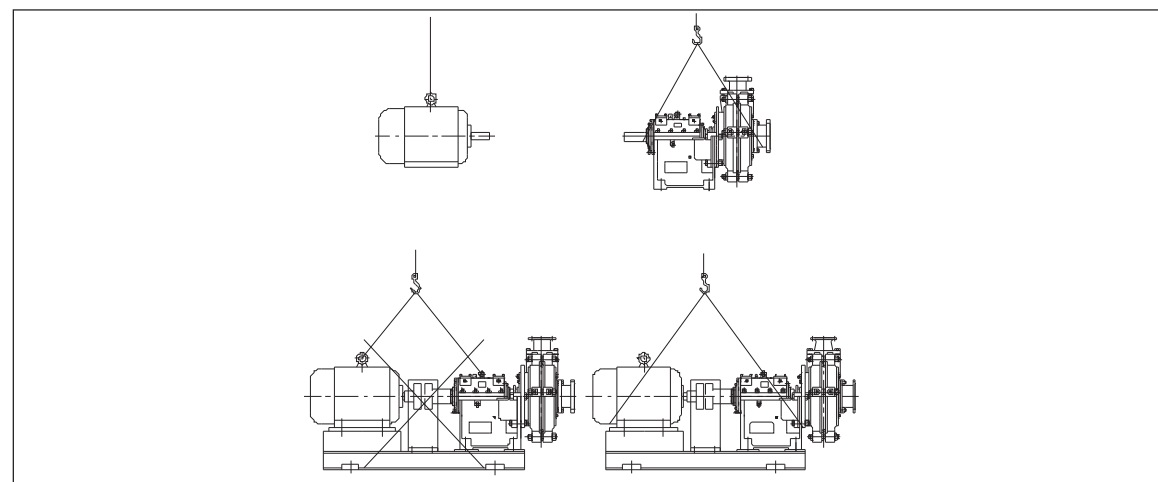
### 1.2 Transportation

In any case, the horizontal rotation is suggested during the transportation because in this way transportation in any way can be accepted, for instance, by highway, by train or by air, etc. The pump set can be rotated stably without any danger.

During the transportation, the pump set shall be placed firmly onto the carrier shelf, and all of the easy-to-loose and removable parts shall be fixed onto it firmly.

### 1.3 Lifting of the pump set with a crane

The motor sling hole can only be applied to lift the motor rather than the pump set. The pull force direction shall be paid attention to while the pump set is being lifted with a crane, whose angle shall be more than 90°. Lifting ropes shall be applied at both sides respectively. The correct lifting means is illustrated as follows:



## 2. 产品及附件介绍 Introduction of product and accessory

### 2.1 技术特性

AH型泵为单级、单吸、卧式、悬臂双泵壳形式，壳体采用径向剖分，从泵进口看为逆时针旋转。它主要用于矿山、冶金、煤炭、电力、建材、环保、水利等行业及工程中输送含有固体颗粒的浆体。固体混合液最大体积浓度 $CV \leq 30\%$ ，重量浓度 $CW \leq 60\%$ 。

### 2.2 型号意义

SH 100/75 B GR

高瑞夫泵业 Gorrif Pump

托架形式 Bracket form

进出口口径 Internal diameter of inlet and outlet

卧式渣浆泵 Horizontal centrifugal pump

### 2.1 Technical feature

AH type pump is single stage, single suction, horizontal, double cantilever shell structure. Seeing from the pump inlet side, the pump rotates anticlockwise. It is mostly applied in mines, coal, electric power, metallurgy, chemical industry, environmental protection, water resources, etc transporting slurry containing solid granules. The maximum volume density for the solid mixed liquids:  $CV \leq 30\%$ , and its weight density is  $CW \leq 60\%$ .

### 2.2 Code identification

### 2.3 零件设计

#### 2.3.1 泵壳

采用双壳式结构，内泵壳耐磨，外泵壳承压，泵的出口可按45°角沿圆周旋转8个方位调整，功能设置侧重分开，维修、更换方便。泵设计容许工作压力最高按2MPa，允许多级串联使用。

#### 2.3.2 叶轮

叶轮采用两相流理论设计和制造的，磨损率低、通过能力好。

#### 2.3.3 托架

水平中开式稀油润滑托架，转子部件可轴向调整，拆装、检修、调整方便。

#### 2.3.4 轴承及密封

轴承配置合理，使用寿命长。设有备用水冷系统，冗余设计法确保轴承低温运行。轴承盖与运转部件之间为非接触式螺旋密封，确保托架整个寿命期内无磨损、不漏油。

#### 2.3.5 轴封

根据现场运行的实际条件及渣浆特性，可选用最适宜的密封型式。

单级使用时，采用副叶轮加填料组合式密封只需加低压轴封水或润滑油脂。串联使用时，采用填料密封加高压轴封水。

对于不允许有任何泄漏的工况，可快速拆装的集装式机封是最佳的选择，集装式机封运转可靠性高，整体拆装方便，机封的压缩量不受转子部件轴向位置调整的影响。ZHJ型加高压轴封水进入泵腔；ZGJ型加一般自来水冲洗，不进入泵腔；ZJW型无任何冲洗水。详细应用数据见使用说明书。

### 2.4 安装型式

卧式安装，请参阅使用说明书“安装”一节。

### 2.5 附件

泵的附件根据各有关使用说明书而定。

### 2.6 尺寸及重量

要想知道泵的尺寸和重量，请参阅泵装配图。

### 2.3 Design of parts

#### 2.3.1 Pump casing

Double shell structure is applied on the pump, and the inner pump casing is wear-resistant, and the external one is bearing the pressure. The outlet of pump can rotate 8 orientation and adjust by 45° angle along the circle, which is convenient for maintenance and replacement. Designed allowable working pressure of the pump is 1.6MPa, and multistage series can be allowed to use.

#### 2.3.2 Impeller

Two phase flow theory is applied and manufactured on the impeller with low wear rate and good transportation.

#### 2.3.3 Frame

It is horizontal split thin-oil lubrication frame. The rotor part can be adjusted axially, and it is convenient to be disassembled, maintained and adjusted.

#### 2.3.4 Bearing and sealing

The bearing has rational configuration and long service life. The spare water-cooling system and redundancy design method guarantee that the bearing can be operated under low temperature. Non-contact seal is used between bearing cover and running part to guarantee that there is no abrasion and oil leakage during the whole service time.

#### 2.3.5 Shaft seal

According to the actual conditions on site and slime characteristics, the most suitable seal form can be selected.

When the pump is used single-stagedly, the combined expeller and packing seal form is used and only low pressure shaft seal water or lubrication grease is needed to be fed. When the pump is used in case of series connection, packing seal and high pressure shaft seal water are used.

As to the operating condition allowing no leakage, the cartridge seals which is convenient to be disassembled is the best choice. Cartridge seals operation is characterized by its high reliability, and convenient disassembly for a complete set. The compression amount of mechanical seal is not affected by the axial location of pump rotor part. ZHJ-type for high pressure shaft seal water enters the pump chamber; ZGJ-type, for running water is used to wash without entering the pump chamber. Detailed data please see the operation manual book.

### 2.4 Type of installation

Horizontal installation, please see the operation manual book chapter "Installation".

### 2.5 Accessory

The accessories of the pump is decided by relevant operation manual book.

### 2.6 Dimension and weight

Please see the assembly drawing to know more about the dimension and weight of the pump.

## 3. 现场安装 Installation on-site

### 3.1 安全细则

在危险地段工作的电力设备须遵守防爆规定，铭牌上已标明了这一点。如果设备装在危险地段，请务必遵守当地有关防爆规定、设备检验合格规定，以及负责认可的管理机构所定的规定。检验合格证必须放在靠近泵机组运转的地方。

### 3.2 装配前的检查

根据“安装图”给定的尺寸，所有必要的工作须准备好。按照标准，混凝土基础必须有足够的强度以确保装配安全可靠。将机组放基础上之前，混凝土基础必须紧固、表面应光滑平整。

### 3.1 Safety rules

The anti-explosion rules must be abided by for the electrical equipment at the hazardous area, which has been marked on the nameplate. If the equipment is installed at a dangerous area, the relevant local anti-explosion rules, the equipment inspection qualification rules and the rules stipulated by the management organization responsible for approval must be abided by. The inspection certificate must be placed near the location where the pump set is running.

### 3.2 The check-up prior to installation

Based on the designated size stated in the installation diagram, all the necessary work must be well prepared. According to the standard, there must be sufficient strength to make the installation safe and reliable. Before the pump set is placed onto the foundation, the concrete foundation must be firm and the surface shall be very smooth and flat.

### 3.3 泵/机组的安装

#### 3.3.1 安装(现场安装)

1) 安装之前混凝土基础必须紧固、表面应光滑平整。

2) 把地脚螺栓插入底座上的地脚孔,把泵放在基础上,用水平仪在轴端或出口端调整水平,在底座和基础间靠近地脚螺栓处必须垫垫块。

3) 泵调整好水平后,给地脚螺栓灌浆,当砂浆坚固后,均匀地拧紧螺栓,并重新调整水平,然后给底座灌浆。

#### 3.3.2 泵和电机带公共底座的安装

泵的安装须由经过培训的、对水泵安装富有经验的人员进行。

泵和电机带公共底座的安装形式:

- 1) 测量并记下泵的位置。
- 2) 把泵机组放在基础上,地脚螺栓插入基础中并调整。基础和底座之间4-5cm间隙。
- 3) 对基础螺栓灌浆并让其坚固。
- 4) 用调整螺钉精确地调整机组,并在联轴器处对中。
- 5) 均匀地拧紧地脚螺栓。
- 6) 对底座灌浆,重新检查,如果有必要的话重新调整(用垫片)。

#### 3.3.3 泵和电机的调整

必须确保泵和电机在联轴器处精确对中。即使泵和电机作为一个完整的机组提供,如果有必要也需对中。方法:如果联轴器的轴向和径向偏差不得超过0.1mm,那么可以认为泵机组已很好地对中,每次联轴器两端均匀旋转量具90°,用游标卡尺或千分尺检查,所有点的读数必须均匀。

### 3.3 The installation of the pump/pump set

#### 3.3.1 Installation(on-site installation)

1) Before the installation,the concrete foundation must be very firm and the surface must be smooth and flat.

2) Place the foot bolts into the foot holes on the base.Put the pump onto the foundation,make adjustment over the leveling with a gradienter at the shaft end or outlet.The block must be placed next to foot bolts between the base and foundation.

3) After the leveling is adjusted,the foot bolts shall be grouted.After the mortar becomes solidified,the Bolts shall be screwed down uniformly and then its leveling must be re-adjusted.Then the base shall be grouted.

#### 3.3.2 The installation of pump & motor with a common base

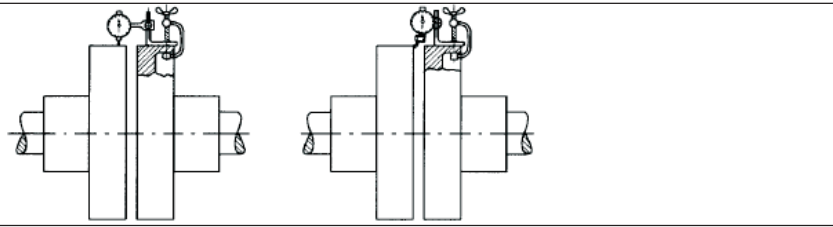
The pump installation must be carried out by those well-trained personnel who have rich experience in installation.

The installation form for the installation of pump and motor with a common base:

- 1) Have a measure and keep a record of the pump location.
- 2) Put the pump set onto the foundation.Place the foot bolts into the base and make some adjustment.There shall be space of 4-5cm between the base and foundation.
- 3) Grout the foundation and make it solidified.
- 4) Adjust the pump set accurately with the adjustment bolts and make alignment at the coupling.
- 5) Screw down the foot bolt uniformly.
- 6) Grout the foundation.Have a re-checkup.If needed,the re-adjustment shall be carried out(with washers).

#### 3.3.3 The adjustment of the pump & motor

It must be guaranteed that the pump and motor must be aligned accurately at the coupling.Even if the pump and motor are provided as a complete set,the alignment must be made if needed.Means:If the tolerance between the radial force and axial force does not exceed 0.1mm,in which case it is considered as well-aligned.The gauge shall be turned at an angle of 90° uniformly at both ends of the coupling for each time,which is to be tested with a noinus caliper or a micrometer caliper.All the readings must be uniform.



**ATTENTION** 泵启动之前,要检查运行数据,以确保铭牌上的数据,例如:工作压力、频率、输送浆液的温度、密度、浓度及固体颗粒直径等,与合同上的数据及系统数据相符。

#### 3.4 管路连接

**ATTENTION** 不要把泵本身当作管路支撑点。吸上管路应成向上的斜度布置,倒灌管路应成向下的斜度布置,泵的进口管路力求简短,装置汽蚀余量必须大于泵汽蚀余量,在输送重量浓度大的渣浆时,推荐采用倒灌装置。管路应该在泵的附近设可靠支撑,并且不能承受任何压力或发生变形。它们的重量一定不要对泵施加任何负载。

Before the pump is being operated,the running data shall be checked up to be assured of the data marked on the nameplate.For instance,the working pressure,frequency,the temperature of the liquid transmitted,etc must be in line with the data in the contract and systematic data.

#### 3.4 Pipe connection

Don't make the pump itself become the pipe support point. The suction pipe shall be displayed aslant upwards.The reverse-grouting pipe shall be laid aslant downwards.The pump inlet is required to be cut short,and the device NPSH must be exceeding the pump NPSH.When transporting the slurry with high weight and density,backward style installation is recommended to use,and can not bear any pressure or deformation.Their weight can not put any load on the pump.

**ATTENTION** 进出口管路的直径需要根据输送浆体的临界沉降流速选择,临界沉降流速与所输送浆体中的固体颗粒的粒径、质量和含量相关。必须保证进出口管路的平均流速要大于浆体的临界沉降流速,否则会造成浆体中固体颗粒的沉降,导致管内形成固体颗粒床面,摩擦损失随之相应地增大并常常具有脉动性,甚至导致管路堵塞。

**ATTENTION** 注意由以下原因产生的出口和进口附加负载:充满浆体的管子的重量,温度变化引起的管子长度的变化,伸缩器放松引起的反作用力。它们一定不要超过给定值。

**!** 管路中的力过大或超过允许值会导致泵的泄漏,从而输送的介质会逸到空气中,输送热介质时会有生命危险!管路安装之前必须将进出口法兰盖拆除。

#### 3.4.1 辅助管路

如果泵需要辅助装置(如冷却、加热、密封、冲洗和润滑液等),请按装配图上的尺寸和位置或参照辅助管路示意图连接。更多的信息请参阅相关使用说明书中有关辅助管路的章节。

**ATTENTION** 安装这些辅助管路能使泵正常工作,所以它具有重要意义。

#### 3.4.2 联轴器防护罩

**!** 为了避免事故的发生,泵不能在没有联轴器防护罩的情况下工作。交货时如果用户特殊要求不要防护罩,那么操作人员必须安装一个。

#### 3.5 最后的检查

再检查一下校正是否正确。  
手必须能容易地转动轴(联轴器带动轴转)。

**ATTENTION** 检查所有管路是否牢固,是否能正常工作。

## 4. 运行、启动、停机 The operation,start-up/turn-off

请务必按以下要求去做,避免不遵守规章制度所发生的故障。

#### 4.1 运行前的检查

- 泵在启动之前必须检查以下几项:
- 泵所带的底座是否与基础紧固
  - 联轴器与泵机组是否校正
  - 管路是否按要求连接
  - 电机是否按使用说明书安装
  - 手是否能容易地转动转子(至少一周)
  - 联轴器防护罩是否装好
  - 操作人员是否充分了解可能发生的故障以及要遵守的有关安全规范
  - 是否排除过载
  - 轴封是否按使用说明予以安装

Diameter of inlet&outlet pipe shall be decided by critical deposition flow velocity of the transported slurry.And critical deposition flow velocity is related with the particle size,weight and content of the solid particles.Average velocity of inlet&outlet pipe must be more than the critical deposition flow velocity of the transported slurry,or the solid particles in the slurry shall subside causing solid-particle-bed formed inside of the pipe,then frictional loss shall increase accordingly leading the pipe blocked.

Pay attention to the outlet and inlet additional load brought about by the following reasons:the weight of the filled pipe,the changes over the pipe length as a result of temperature rise, the counter -force resulting from the looseness of the slip joint, all of which can not exceed the certain value specified.

If there is too much strength on the pipe or the strength value exceeds the allowable limit,then the pump leakage shall be brought about;in which case,the medium transmitted may float out into the air and so when it comes to transmitting hot medium,a person's life may be threatened!Before the pipe is being installed,the inlet and outlet flange cover must be removed.

#### 3.4.1 Auxiliary pipes

If the auxiliary device is needed for the pump(for instance,cooling,heating,sealing,flushing and lubrication,etc),the connections shall be made according to the size and location marked on the assembly diagram or referring to the auxiliary pipe illustration.More information can be referred to the relevant chapter about the auxiliary pipes in the corresponding instruction manuals.

The installation of these auxiliary pipes can facilitate the pump normal operation,which has significant meaning.

#### 3.4.2 Coupling guard cover

The pump can not be operated without the coupling guard cover so as to avoid accidents.If the customer does not need to install the guard cover for the delivery,the operator must install one.

#### 3.5 The final check-up

Please check up for another time whether the adjustment is right or not.

The shaft can be turned over easily with hands(The coupling drives the shaft to rotate.)

Check on whether all the pipes are fixed firmly or not and whether they can be operated normally.

Please carry out the job as requested by the following to avoid the failures resulting from the non-conformance with the rules and regulations.

#### 4.1 The check-up prior to the operation

The following shall be checked up before the pump is being started up:

- Whether the pump base and foundation are fixed firmly or not
- Whether the coupling and pump set is made adjustment or not
- Whether the pipe is connected as requested or not
- Whether the motor is installed in accordance with the use manual or not
- Whether the rotor can be turned over easily with hands(at least one circle)or not
- Whether the coupling guard cover has been well installed or not
- Whether the operators know well possible failures and some relevant rules that they must conform to or not
- Whether the overload has been eliminated
- Whether the shaft seal is installed according to the use manual or not



- 如果提供辅助装置,那么这些装置是否按使用说明予以安装

- 是否所有的轴承已作了良好的润滑
- 泵是否已排气
- 泵转向是否正确(严禁反转)

#### 4.2 轴封

装轴封时,请参阅使用说明书“轴封”一节。如果泵长期停止工作,就要按4.6节所述采取措施。

#### 4.3 排气

在泵起动之前,泵和管路必须排尽空气,并且用介质灌注。

#### 4.4 运行

##### 4.4.1 检查泵的转向

泵的转向必须正确。如果转向错误,泵机组可能损坏。

正确的转向:从驱动端看泵为顺时针方向旋转。

##### 4.4.2 启动

泵不允许干运转。

如果在出口管路中没有止回阀,就关闭出口阀

- 如果有的话,进口阀必须完全打开
- 打开所有的辅助管路(冷却、加热、密封、冲洗和润滑油),并检查流量
- 完成第二节中所介绍的步骤后,启动电机
- 当系统开始泵送介质时,可以在压力表上看到压力升高,然后慢慢打出口阀

泵只有在起动和停止时才关闭出口阀,否则泵将因过热而损坏。

##### 4.4.3 泵工作范围

根据Q-H特性曲线,流量Q可自行调节以适应扬程的变化,泵允许的工作范围有限,这是由各个原因造成的。

###### 1) 低流量部分负载工作极限:

这个极限在Q-H特性曲线中有Qmin表示,或未画的特性曲线的延长线表示。如下页图所示。

泵不允许在Q=0-Qmin的范围内工作,若在

这个范围长期运行会引起机械负载大量增加,从而使零件无法承受,但允许瞬时通过此临界范围,如启动泵时。

###### 2) 部分负载和过载范围内汽蚀余量NPSH的极限

这两个极限可由必需汽蚀余量NPSHR和有效汽蚀余量NPSHA的关系确定,它们按以下方法得到:NPSHR和NPSHA的交点投影到Q-H特性曲线上,这两个投影点就确定了工作极限(指曲线以下部分)。

泵在设计工况下工作时不必检查NPSH的工作极限,但如果系统发生变化时,就必须检查NPSH值,若有必要应向三联公司技术部门咨询。

If the auxiliary devices have been provided, whether these devices are being installed according to the use manual or not

Whether the air in the pump has been discharged or not  
Whether the rotation of the pump is correct (Reverse is not allowed!)

#### 4.2 Shaft seal

While the shaft seal is being installed, please refer to the chapter of "shaft seal" in the manual. If the pump is not being used for a long period of time, the measure in chapter of 4.6 shall be taken.

#### 4.3 Air discharge

Before the pump is being operated, the air inside the pump and pipe must be discharged fully and the get it fed with the medium.

#### 4.4 Operation

##### 4.4.1 Check-up on the pump rotation direction

The pump rotation direction must be right. If it is wrong, the pump set may be damaged.

The correct rotation direction: Pump rotates clockwise seeing from the drive end.

##### 4.4.2 Start-up

The pump is not allowed to run dry.

If there is no check valve at the outlet, the outlet valve shall be closed.

If there are check valves, the inlet valve shall be opened fully.

Open all the auxiliary pipes (cooling, heating, sealing, flushing and lubrication oil), and the capacity shall also be checked on.

After the steps introduced in the chapter two have been finished, the motor can be turned on.

While the system begins to transmit the medium, the pressure rise can be seen from the pressure gauge, and then the outlet valve can be opened slowly.

The outlet valve can be closed only when the pump is being started up or turned off, otherwise, the pump shall be damaged resulted from overheating.

##### 4.4.3 The pump working range

According to the O-H characteristic curves, the capacity of Q can be adjusted automatically to be adapted to the head changes. The pump allowable working range is limited, which is caused by several reasons.

The pump is not allowed to be operated within the range of Q=0-Qmin. If it has been running within the range for a long period of time, the mechanical seal overload shall be enhanced so that the parts can not bear. But it is allowed to pass the critical range just for an instant, for example, while the pump is being started up.

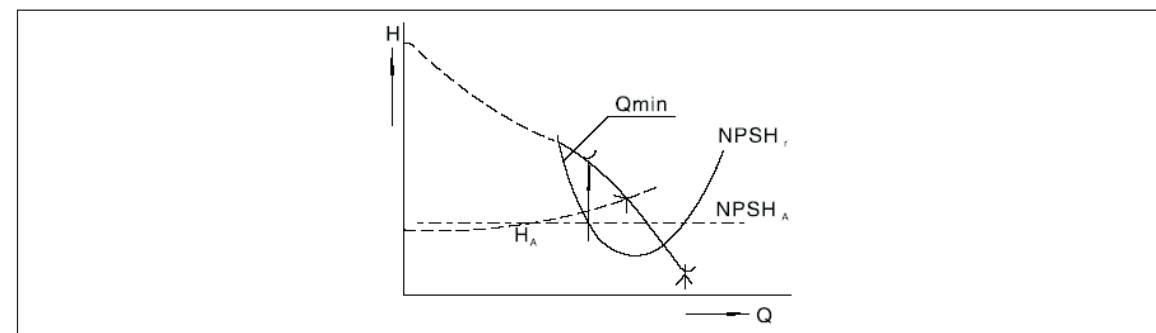
This limit is shown as Qmin in the Q-H characteristic curve, or it can be illustrated as the lengthened line in the un-drawn characteristic curve, which is illustrated as follows.

###### 1) The working limit: the low capacity part overload

###### 2) Partial overload and the limit NPSH within the overload range

These two limits can be decided based on the relations between the NPSHR and NPSHA, which can be obtained through the following means: the intersection of NPSHR and NPSHA is projected onto the O-H characteristic curve, and these two points determine the working limit (indicating the part below the curve).

The working limit of NPSH shall not be checked up while the pump is working under the designed working conditions. But if there is any change over the system, the NPSH value must be checked on. If needed, Sanlian Company must be consulted for advice.



#### 4.5 停机

关闭出口阀,如果在出口管路中有止回阀,出口阀可以维持打开状态以得到一个回压。关闭泵时,进口阀不要关闭,关闭电机时,要确保机组能平缓地停下来。泵应当有一适当的后运转期,在这期间,要切断热源,这样才能使输送的介质完全冷却下来,从而避免泵中产生任何热量。

为了避免浆体中的固体颗粒发生沉降,应用清水把护套及管路冲洗干净。

泵长期停止工作时,进口阀必须关闭。关闭辅助管路,泵的轴封即使在停机状态也要用密封液润滑。

在冰冻或长期停止使用时,应排除泵及管路中的介质,以免冻裂。

#### 4.6 停机、保管、维修

高端夫泵业每台泵在出厂时都经过严格的检验,保管泵时,建议采取以下措施。

##### 4.6.1 新泵的保管

高端夫提供的泵已对保管作了充分准备。如果泵在室内按要求保管,最长存放期可达12个月,应将泵保存在干燥的地方。

##### 4.6.2 长期停止使用时应采取的措施

1) 泵应保持装配状态,且应定期检查工作情况。泵长期停止使用时,为了确保泵随时可以启动,并防止泵内及泵吸入口处产生沉淀物,每个月或每三个月要启动一次泵(大约五分钟),泵工作之前要检查运转情况以确保泵内是否有足够的液体启动泵。

2) 将泵从管路中拆下,并按5.1至5.4节所述进行检查。用防护剂喷涂泵壳内壁特别是叶轮间隙处,喷涂吸入口和排出口,然后将进出口盖住(如用塑料盖或与之类似的东西)。

#### 4.7 保管后的运行

泵运行前应按5.1和5.2所述进行检查和维修。此外,请务必参阅4.1“运行”一节及4.4.3“工作极限”一节。完成以上工作之后,所有的安全保护装置在启动泵机组之前都必须按要求重新安装,投入使用。

#### 4.5 Turn-off

Close the outlet valve. If there is any check valve at the outlet pipe, the outlet valve can be kept being open so as to obtain a return pressure. While the pump is being turned off, the inlet valve shall not be closed. While the motor is being turned off, it must be guaranteed that the set can be turned off very smoothly. There shall be appropriate post-period of running time for the pump, during which period, the heating source must be turned off so that the medium transmitted can be cooling down completely to avoid any heat produced inside the pump.

In case the sedimentation of solid particles in the slurry, volute liner and pipe shall be cleaned out with clean water.

While the pump is not being used for a long period of time, the inlet valve must be closed.

Close the auxiliary pipes. The sealing liquid lubrication must be applied even if it is in a state of turn-off.

When it is being frozen or in disuse for a long period of time, the medium inside the pump and pipe must be eliminated to prevent it from frost cracking.

#### 4.6 Turn-off/storage/maintenance

Every set of the pump goes through strict inspection when it is for delivery. When it comes to the pump storage, the following measures shall be taken.

##### 4.6.1 The storage of new pump

For the new pump provided by Gorrif Pump Solutions, Gorrif has well prepared for its storage. In case the pump is being kept indoors according to the standard, the maximum storage time can reach 12 months. The pump shall be kept at a dry place.

##### 4.6.2 Measures taken in case of the long period of the disuse

1) The pump shall be kept under the state of assembly, and the periodical check-up must be carried out. When the pump is in disuse for a long period of time, the pump shall be started up every 1 or 3 months (for about 5 minutes) to guarantee that the pump can be started up at any time to avoid any deposits from being produced at the inlet. Before the pump is operated, the operating status shall be checked up to guarantee that there is sufficient amount of liquid inside the pump to start up the pump.

2) Remove the pump from the pipe and take a check-up according to the chapters from 5.1 and 5.2. Apply protective agent onto the inner wall of the casing, especially, onto the impeller gap. It shall be applied at the inlet and outlet, and then the inlet and outlet shall be covered (for example, with plastic cover or something similar).

#### 4.7 Running after the storage


The pump shall be checked up and maintained as described in the chapter 5.1 and 5.2. Besides, please refer to the chapter of 4.1 "operation" and chapter 4.4.3 "working limit". After the work mentioned above have been finished, all the safety protective devices shall be re-installed as requested before the pump set is to be started up and then put into operation.

## 5. 维护、维修 Maintenance

### 5.1 一般规定

必须确保所有的维修、检查和安装工作要由指定的、合格的并且对本使用说明书相当熟悉的专业人员执行。

**ATTENTION** 定期维修计划可以避免昂贵的维修费用,可以使泵不发生故障。并且由于泵送介质的磨蚀性、腐蚀性,会造成过流部件的磨损,当运行一段时间过流件磨损到一定极限后,性能将降低,甚至泄漏而不能工作,所以要定期更换过流件(叶轮、护套、护板等),间隔期视输送浆体物理(颗粒组成、粒径、形状、硬度、浓度)、化学(酸、碱、油)特性而定。

 以上这些工作必须在切断电源的情况下进行,以免泵机组突然启动。(生命危险!) 泵输送对健康有害的液体时,必须消毒。只有将介质排尽,人对环境才没有危害。同时,还必须遵守有关规定。(生命危险!)

### 5.2 维护、检查

#### 5.2.1 运行管理

泵在运行期间要特别注意以下几点:

- 泵必须平稳地运转
- 泵不允许干运转
- 为防止介质温升,泵不能在出口阀关闭的情况下

下长期运转

- 轴承温度不得超过75℃
- 如果有进口阀,在泵运行时不能关闭
- 定期检查油位
- 定期检查和起动用泵
- 检查辅助管路是否良好连接
- 检查联轴器上的弹性元件,有磨损立即更换
- 检查轴封水的流量及压力

#### 5.2.2 轴封的维护

轴封的维护可按使用说明书“轴封”一节进行维护。

#### 5.2.3 轴承的维护

**ATTENTION** 泵处于连续重载荷(轴向、径向)下工作,合适的润滑油质量决定了轴承的寿命和安全运行。油不要含杂质、酸性物质及其它脂类,为了确保形成油膜,在运行温度下油的粘度不低12mm<sup>2</sup>/s是必需的。

在泵首次试运行或轴承检修的情况下,在泵运转了10~15个小时以后,应排放并净化所有润滑油,重新从托架上注油孔注入清洁润滑油至油位线。正常运行时,应每6个月更新一次润滑油,并清洗油腔。

### 5.3 拆卸

拆卸前要确保泵不会突然运行,进口阀和出口阀必须关闭,泵必须用清水冲洗,压力必须释放。

拆卸和重新装配必须根据有关剖视图进行。

### 5.1 Common regulations

Please make sure that all the maintenance ,check-up and installation must be carried out by those designated,qualified professionals who are fairly familiar with the manual.

The periodical maintenance can avoid the expensive maintenance fee to make the pump free from any failures. Due to the abrasability, corrosivity of the pumped medium,wet part will be abraded.After operating for some time,wet part will reach its limitation,which will make the performance reduce,even cause leakage.So it is very necessary to replace wet part(impeller,volute liner,guard plate,etc) periodically,and interval time shall be decided by the physical and chemical properties of the transported slurry,(form of particle, particle diameter,size, hardness, concentration,acid,alkali,oil).

All the work mentioned above must be carried out while the electricity has been cut off to prevent the pump set from being started up all of a sudden(Death of Danger!)

When the pump transmits hazardous liquids,it must be sterilized.After the medium has been discharged completely,there is no danger for people and the environment.Besides,some relevant rules must be abided by(Death of Danger!)

### 5.2 Maintenance/check-up

#### 5.2.1 Operation/management

The following points must be paid great attention to while the pump is being operated:

The pump must be operated stably.

The pump is not allowed to run dry.

To avoid the medium temperature rise, the pump can not be operated for a long period of time while the outlet valve has been closed.

The bearing temperature can not exceed 75℃.

Take a periodical check-up on the oil level.

If there is ant inlet valve,it can not be closed while the pump is being operated.

Take a periodical check-up and start up the standby pump.

Check on whether the auxiliary pipe has been well connected.

Check on the flexible components on the coupling. If there is abrasion,please have replacement immediately.

Check on the capacity and pressure of shaft seal water.

#### 5.2.2 The maintenance of the shaft seal

For the maintenance of the shaft seal, please see the manual book “shaft seal” .

#### 5.2.3 The maintenance of the bearing

Pump operates under continuous heavy load ( axial direction、 radial direction),so suitable lubricating oil determines the service time and safety operation of the bearing.The oil shall not include impurity、 acidic material or other grease.In order to produce the oil film,the viscosity of the oil under running temperature shall be no less than 12mm<sup>2</sup>/s,which is necessary.

First time the pump is being operated or when maintaining the bearing,after 10~15 hours'operation of the pump,all the lubricating oil shall be discharged and purified,then clean lubricating oil shall be filled in to oil level line through oil hole that is on the frame.Lubricating oil shall be replaced every 6 months and oil chamber shall be cleaned when operating normally.

### 5.3 Disassembly

Prior to the disassembly,please make sure that the pump shall not start running all of a sudden and the inlet valve and outlet valve must be closed.The pump must be cooled down to the ambient temperature.The pump must be discharged completely and washed with clean water .The pressure must be released.

The disassembly and re-assembly must be carried out in accordance with the relevant sectional view.

### 5.3.1 基本规定及建议

维修和维护工作必须由专业人员执行,必须使用原备件。必须遵守安全细则,与电机相关联的操作必须按照有关电机厂家的说明和规定进行。

拆卸和重新装配必须根据有关总装图进行。万一

发生故障,请与高瑞夫泵业售后服务部门联系。

#### 5.3.2 拆卸步骤

- 1) 关闭进出口阀门;
- 2) 拆除泵上所有辅助管路;
- 3) 拆除联轴器防护罩;
- 4) 拆除泵进出口短管;
- 5) 用起重机或行车吊索系住泵盖上吊环螺钉,拆下泵盖侧泵盖螺柱上的螺母,吊走泵盖(含前护板),放到旁边,然后拆下泵盖与前护板之间的连接螺栓,拆下前护板;
- 6) 用起重机或行车吊住护套,拆下泵盖螺柱上所有螺母,取出泵盖螺柱,拆下护套;
- 7) 旋下叶轮,如轴上有拆卸环则先要拆下;
- 8) 拆下后护板;
- 9) 拆下定位套或副叶轮,泵若采用机械密封则没有;

10) 旋下水封管接头(如有);

11) 拆下对开填料压盖;

12) 如泵为集装式机械密封,则需要将机封的定位块给装上,然后再松开机封上的紧定螺钉,使机封与泵轴分离,然后拆下集装式机封与轴封箱之间的连接螺栓,拆下机封;

13) 拆下填料箱、填料环、填料或轴封箱;

14) 拆下轴套;

15) 用起重机或行车吊索系住泵体上吊环螺钉,拆下泵体与托架体之间的连接螺栓,拆下泵体;

16) 至此,泵壳部分的拆卸已完成,如需要,托架组件的拆卸按下述进行;

17) 放掉托架体内的润滑油;

18) 拆下联轴器上的柱销;

19) 拆下托架体与底座之间的连接螺栓,将托架体吊到旁边;

20) 拆下泵联轴器与键,拆下圆螺母;

21) 拆下托架两端挡尘盖、轴承压盖与挡套;

22) 拆下托架体与托架盖之间连接的螺柱与螺母锥销;将托架盖吊到旁边;

23) 取出轴组件,拆下轴承盒,用专用工具拆下两端轴承。

### 5.4 重新装配

重新装配按拆卸顺序相反进行,总装图和各零件表可作为参考。

装配和拆卸轴封、轴承时要按照规范的装配工艺或安装说明进行。

所有“O”型圈和橡胶垫必须更换,其安装处必须清洗。在安装之前所有的密封元件必须装到合适的位置。

### 5.3.1 Basic regulations and advise

Maintenance work must be done by professional person, and original spare parts must be used.Safety rules must be abided by.Operation related with motor must be done according to the instructions and regulations.

#### 5.3.2 Procedure of disassembly

- 1) Close the inlet and outlet valve.
- 2) Remove all the auxiliary pipes on the pump.
- 3) Remove the coupling guard cover.
- 4) Remove the short pipe on the inlet&outlet of the pump.
- 5) Use a crane or sling to tie to the lifting bolt on the pump cover,remove nuts on the side of the pump cover studs which are located on the pump cover,lift the pump cover to one side (front guard plate included),then remove connecting bolts between the pump cover and front guard plate,remove the front guard plate.
- 6) Use a crane or sling volute liner,remove all the nuts on the pump studs,take the pump cover studs out,remove the volute liner.
- 7) Unscrew the impeller,the dismantable ring shall be disassembled first if it is on the shaft.
- 8) Remove back guard plate
- 9) Remove locating sleeve or expeller,if mechanical seal is used then there is no locating sleeve or expeller.
- 10) Unscrew the sealing water pipe connection(If had)
- 11) Remove the split packing gland.
- 12) If the pump is cartridge seal,then the located block shall be installed ,then loosen the anti-Tamper Screw to make the mechanical seal and pump shaft separate.Then disassemble connecting bolts between cartridge seal and shaft seal box,remove the mechanical seal.
- 13) Remove stuffing box,packing ring,packing or shaft seal box.
- 14) Remove the shaft sleeve.
- 15) Use a crane or sling to tie to the lifting bolt on the pump casing,remove the connecting bolts between pump casing and frame body,remove pump casing.
- 16) Till now ,the disassembly of pump casing has been finished,if needed,he disassembly of frame assembly is as follows
- 17) Discharge the lubricating oil in the frame
- 18) Remove the pin on the coupling
- 19) Disassemble the connecting bolts between the frame and the base,and lift the frame body to one side.
- 20) Disassemble pump coupling and key, disassemble the round nut
- 21) Disassemble the dust cover,bearing cover and spacer sleeve on both sides of the frame,
- 22) Disassemble the studs and taper pins with external thread between the frame and the frame cover;lift the frame cover to one side
- 23)Take the shaft assembly out,disassemble the bearing box,use the special tools to disassemble the bearings on both sides

### 5.4 Re-assembly

The re-assembly can be carried out counter to the disassembly process,and the overall installation diagram various part list can be referred to.

The assembly and disassembly of the shaft seal,bearing must be carried out in accordance with the specified assembly technique or installation instruction.

The O-rings and V-rings must be replaced,and their installation location must be washed.Prior to the installation,all the seal components must be placed at their proper location..



## 6. 故障及排除

故障	原因	解决方法
泵不出水，压力表剧烈跳动	<ol style="list-style-type: none"> <li>渣浆重量浓度太大</li> <li>叶轮、护套、护板磨损严重</li> <li>进口压力太低</li> <li>进口管路漏气</li> <li>泵内进有空气</li> </ol>	<ol style="list-style-type: none"> <li>降低渣浆浓度</li> <li>更换叶轮、护套、护板</li> <li>降低吸上高度</li> <li>排除漏气现象</li> <li>排除积气</li> </ol>
流量不足或扬程不足	<ol style="list-style-type: none"> <li>叶轮、护套、护板磨损严重</li> <li>吸水管、供水管有漏洞，填料箱严重磨损</li> <li>渣浆浓度太大</li> <li>叶轮流道或管中堵塞</li> <li>转速不够</li> </ol>	<ol style="list-style-type: none"> <li>更换叶轮、护套、护板</li> <li>更换管路和填料箱</li> <li>降低渣浆浓度</li> <li>清除杂物</li> <li>调整或更换</li> </ol>
刚开泵有流量，随即没有	<ol style="list-style-type: none"> <li>底阀、管路或叶轮等堵塞</li> <li>渣浆中有气体</li> <li>水池的水位太低</li> </ol>	<ol style="list-style-type: none"> <li>清除杂物</li> <li>排除气体</li> <li>提高水池水位</li> </ol>
功率过大，电机发热	<ol style="list-style-type: none"> <li>渣浆重量浓度太大</li> <li>护套与叶轮之间有异物卡住</li> <li>填料压得太紧</li> <li>流量超过规定的范围</li> </ol>	<ol style="list-style-type: none"> <li>降低渣浆重量浓度</li> <li>清除异物</li> <li>调整填料</li> <li>减小到规定的范围</li> </ol>
水封处泄漏量太大	<ol style="list-style-type: none"> <li>轴封水压力太大</li> <li>填料磨损</li> <li>填料压盖未压紧</li> <li>机械密封损坏</li> </ol>	<ol style="list-style-type: none"> <li>调整轴封水压力</li> <li>更换填料</li> <li>压紧填料</li> <li>更换机封</li> </ol>
轴承发热	<ol style="list-style-type: none"> <li>水泵承受了管路的重量</li> <li>振动大</li> <li>泵与电机轴不同心</li> <li>润滑油不够、过量或已变质</li> <li>轴承损坏</li> </ol>	<ol style="list-style-type: none"> <li>调整管路支架，不允许泵承受管路重量</li> <li>检查并消除振动原因</li> <li>调整同心度</li> <li>添加、减少或更换润滑油</li> <li>更换轴承</li> </ol>
泵的振动大、噪音大	<ol style="list-style-type: none"> <li>泵与电机轴不同心</li> <li>叶轮与护套之间有异物卡住</li> <li>轴承损坏</li> <li>泵发生汽蚀</li> </ol>	<ol style="list-style-type: none"> <li>调整同心度</li> <li>清除异物</li> <li>更换轴承</li> <li>找出并清除汽蚀原因</li> </ol>

## 6.DAILY MAINTENANCE FAILURES&SOLUTIONS

Malfunction	Reason	Solution
The pump can not pump water, and the pointer of pressure gauge vibrates violently.	<ol style="list-style-type: none"> <li>The weight density of slurry is great.</li> <li>The impeller guard sleeve and guard plate abrade too severely.</li> <li>The inlet pressure is too low.</li> <li>The inlet pipe leaks air.</li> <li>There is air entering the pump.</li> </ol>	<ol style="list-style-type: none"> <li>Reduce the weight density of slurry.</li> <li>Have replacement of impeller guard sleeve and guard guard plate.</li> <li>Reduce the suction height.</li> <li>Eliminate the air leakage.</li> <li>Eliminate the accumulated air.</li> </ol>
Low capacity or low head	<ol style="list-style-type: none"> <li>The impeller, guard sleeve and guard plate abrade too severely.</li> <li>There are holes on the suction and water supply pipe. The packing box abrades too severely.</li> <li>The weight density of slurry is too great.</li> <li>The impeller flow part or the pipe is blocked.</li> <li>The rotation speed is inefficient.</li> </ol>	<ol style="list-style-type: none"> <li>Have replacement of impeller, guard sleeve and guard guard plate.</li> <li>Have replacement of pipeline and packing box.</li> <li>Reduce the weight density of slurry.</li> <li>Clear up sundries.</li> <li>Make adjustment or have replacement.</li> </ol>
There is flow at the beginning, and then no flow at all.	<ol style="list-style-type: none"> <li>The foot valve, pipeline or impeller is blocked.</li> <li>There is air mixing in the slurry.</li> <li>The sump level is too low.</li> </ol>	<ol style="list-style-type: none"> <li>Clear up sundries.</li> <li>Eliminate air.</li> <li>Increase the sump water level.</li> </ol>
The power is too great, and the motor heats much.	<ol style="list-style-type: none"> <li>The weight density of slurry is great.</li> <li>There is foreign matter blocking between the guard sleeve and impeller.</li> <li>The packing is pressed too tightly.</li> <li>The capacity exceeds the range specified.</li> </ol>	<ol style="list-style-type: none"> <li>Reduce the weight density of slurry.</li> <li>Clear up the sundries.</li> <li>Make adjustment of packing.</li> <li>Reduce to the use range specified.</li> </ol>
Large quantities of water leaks out at the water seal.	<ol style="list-style-type: none"> <li>The shaft seal water pressure is too great.</li> <li>The packing has abrasion.</li> <li>The packing gland is not pressed efficiently.</li> <li>Mechanical seal is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>Make adjustment of water seal pressure.</li> <li>Have replacement of packing.</li> <li>Have a good press of packing.</li> <li>Have replacement of Mechanical seal</li> </ol>
The bearing is hot.	<ol style="list-style-type: none"> <li>The pump bears the weight of pipeline.</li> <li>Great vibration.</li> <li>The pump and motor shaft are not concentric.</li> <li>The grease is inadequate or it has gone bad.</li> <li>The bearing has abrasion.</li> </ol>	<ol style="list-style-type: none"> <li>Make adjustment of pipe frame. Pipeline weight is not allowed to be imposed on pump.</li> <li>Have a check and solve the vibration problem.</li> <li>Make adjustment on concentricity.</li> <li>Feed, reduce or replace grease.</li> <li>Have replacement of bearing.</li> </ol>
The pump vibrates greatly and the noise is big.	<ol style="list-style-type: none"> <li>The pump and motor shaft are not concentric.</li> <li>There is foreign matter blocking between the guard sleeve and impeller.</li> <li>There is damage done to the bearing.</li> <li>There is cavitation on the pump.</li> </ol>	<ol style="list-style-type: none"> <li>Make adjustment on concentricity.</li> <li>Clear up sundries.</li> <li>Have replacement of bearing.</li> <li>Find out the cause of cavitation problem and then eliminate it.</li> </ol>